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DICTIONARY

OF

MATERIA MEDICA

AND

PRACTICAL PHARMACY;

INCLUDING A TRANSLATION
OF THE

FORMULÆ OF THE LONDON PHARMACOPŒIA:

BY

WILLIAM THOMAS BRANDE,
OF HER MAJESTY'S MINT.

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TO

THE STUDENTS

OF THE

METROPOLITAN MEDICAL SCHOOLS,

THE FOLLOWING PAGES ARE

DEDICATED

BY THEIR SINCERE FRIEND,

THE AUTHOR.

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PHARMACY AND MATERIA MEDICA.

AA, or ANA; *of each.* This term is constantly used in prescriptions, where the same quantity of several ingredients is employed: thus, ℞ Pulveris scillæ, pulveris ipecacuanhæ, āā granum unum; sacchari albi, acaciæ pulveris, *ana* scrupulum unum: or, Take of powder of squills, powder of ipecacuanha, *of each* one grain; white sugar, powder of gum arabic, *of each* one scruple.

ABBREVIATIONS, *Medical.* In Latin prescriptions, many words, and sometimes all of them, are more or less abbreviated, but the custom is a bad one, inasmuch as it frequently leads to mistakes, and to a careless and slovenly mode of expression, and is often indicative of haste, or of ignorance. Young practitioners, especially, should write their prescriptions at length, as useful practice in Latin, and as obviating errors of the compounder; carefully avoiding, at the same time, all circumlocution and learned affectation of language. The following are specimens of abbreviated and of full-length prescriptions:—

℞ Quin. disul. gr. ij.
Ac. Sul. dil. m. x.
Syr. Aur.,
T. Card. c. āā f ʒss.
Inf. Ros. c. f ℥iss.
M.: ft. h. merid. s. et ant. prand. repet.

℞ Op. pulv.,
Hydr. chlor., āā gr. i.
Ext. Col. c. gr. iij.
Ft. pil. h. s. s.

The same, at length.

RECIPE. Quiniæ disulphatis, grana duo.
Acidi Sulphurici diluti, minima decem.
Syrupi Aurantii,
Tincturæ Cardamomi compositæ, āā semifluidrachmam.
Infusi Rosæ compositi, fluidunciam unam cum semisse.
Misce: fiat haustus, meridie sumendus, et ante prandium repetendus.

RECIPE. Opii pulverisati,
Hydrargyri Chloridi, āā granum unum.
Extracti Colocynthidis compositi, grana tria.
Fiat pilula hora somni sumenda.

Some abbreviations may always be conveniently employed, such as ℞ for *Recipe*, M. for *Misce*, &c.; and the customary abbreviations for *weights* and *measures* (which see), when carefully written, are useful; but it has happened that ʒj (one drachm) has been read for ℥j (one ounce), and *vice versâ:* it is the duty of the prescriber to write a clear and legible hand, and of the compounder of prescriptions to read them cautiously and considerately.

ABIETIS *Resina.* The resin of the *Pinus abies*, or Spruce fir. *Cl.* 21, *Ord.* 8, Monœcia Monadelphia; *Nat. Ord.* Coniferæ.

This tree grows to a height exceeding 150 feet, and flourishes in Europe and the northern parts of Asia. It grows erect and pyramidal, and has a scaly bark: its leaves are of a dingy green, and thickly set upon the branches. The male catkins are ovate, purplish, and scattered in the axils of the leaves; the female are purple and generally terminal: the cones are pendent, brownish-red when ripe, long and cylindrical; the scales are pointed, oval, and arranged in eight spiral rows.

The resin is usually imported from Germany, in casks of one to two hundred weight each; and is obtained either by spontaneous exudation, or by cutting the wood into billets, and heating them, when it flows out. This is the form of the resin, which is termed in the *London Pharmacopœia*, *Resina abietis.* Its only use is as an ingredient in some plasters. It has an aromatic and terebinthine odour; a pale yellowish-brown colour, often intermixed with white streaks; and is occasionally met with in the form of rounded masses or tears, which have spontaneously exuded from and dried upon the trees.

Burgundy pitch, the *Pix abietina* of the list of the *Materia Medica*, is also the produce of the *Pinus abies*, obtained by incision through the bark, where it gradually concretes in the form of flakes, which are successively scraped off, fused in boiling water, and cleansed by pressing through canvass cloths. It is largely collected in the vicinity of Neufchatel. When genuine, it has a very peculiar odour; and although brittle in cold weather, it assumes a tenacious viscidity when gently heated, or kneaded in the warm hand. It therefore forms an excellent adhesive and gently stimulant plaster, exciting some degree of irritation, and often a slight serous exudation from the parts to which it is applied. It will remain adherent to the cuticle for a long time; and is usefully applied to the thorax in catarrhal affections and dyspnœa; and to the loins, in rheumatism and lumbago. These plasters, independent of the cuticular irritation which they excite, are useful as merely keeping the part warm and supported. Apothecaries often keep Burgundy pitch in a ladle, or saucepan, and re-melt the same portion repeatedly, by which it loses its characteristic adhesiveness and irritating quality, and is little more active than common rosin. It should always be applied fresh, and spread upon the leather with the aid of as little heat as possible.

Upon some skins a Burgundy pitch plaster, or any similar application, creates incessant itching, or excites a pimply eruption, attended by intolerable irritation, so that it is frequently necessary to remove it within a few hours after its application. In these instances, however, it often does service, especially in chronic rheumatism, where it may thus prove almost as effectual as a blister.

Spurious Burgundy pitch, manufactured here, is detected chiefly by deficiency in the strong and peculiar odour and viscidity of the genuine resin. It often has a nauseous or stercoraceous smell, is very moist and brittle, and evidently a manufactured or adulterated article.

ABSINTHIUM. *Artemisia absinthium*, or *common Wormwood. Cl.* 19. *Ord.* 2. Syngenesia Polygamia Superflua. *Nat. Ord.* Corymbiferæ.

A perennial herb, growing wild in many parts of Britain: generally cultivated for medical use. Its root is branched and woody; the stems rise to two or three feet, are branching, angled, and furrowed, with the summits panicled. The lower leaves are bipinnate; the upper digitated, with oblong, obtuse, very entire segments. The racemes are erect, and the flowers pedicellated, nodding, hemispherical, and of a brownish-yellow colour. The florets of the disc are numerous, but those of the ray few, and the receptacle is covered with white silky hairs, shorter than the calyx.

Wormwood has very long had a place in the Materia Medica, but it is difficult to say why it is now retained; for, although a powerful bitter, it has been generally discarded on account of its nauseous flavour, as implied by the derivation of its Latin name, from *a*, *privative*, and ψιντος, *pleasure*. Its bitterness is derived from what is usually called extractive matter, and is retained by the decoction after long boiling. A pound of the herb yields about five ounces of extract, consisting, according to Braconnot, of

Bitter extractive matter	50·1
Bitter resin	4·0
Tasteless vegetable albumen	22·3
Starch	2·8
Absynthiate ? of potassa	15·3
Nitrate of potassa	5·5
Traces of muriate and sulphate of potassa	
	100·0

From 100 parts of the dry herb, Hayne obtained

Volatile oil ?	——
Bitter extract	4·
Mucilage	15·1
Bitter resin soluble in ether	8·6
Ditto insoluble in ether	3·4

It is also said to contain acetic acid, acetate of potassa, and sulphate of lime.

The aroma of wormwood depends upon *essential oil*, which may be obtained by distillation, one hundred-weight of the fresh herb yielding, upon an average, four ounces of oil.

Wormwood is sometimes spoken of as an antispasmodic, and the older writers extol it as a vermifuge; but it deserves little attention at the present day in either of these characters. The French are fond of it as a stomachic, and spoil some of their excellent liqueurs with its flavour; the beverage which our publicans sell under the name of *purl*, is said to be ale seasoned with the tops of wormwoood. Applied externally, infusion of wormwood has no advantage over warm water; it is not more discutient, and scarcely more antiseptic.

If used internally, wormwood should be fresh; and for this purpose ℥ij of the recent plant may be infused in a pint of boiling water for four hours.

℞ Hujusce infusi f℥iss.
Spirit. Cinnamomi fʒss.
M.: ft. haustus 4tis vel 6tis horis sumendus.

The powdered root has been recommended by Dr. Burdash as a remedy for epilepsy in doses of fifty to seventy grains.

The ashes of wormwood afford by lixiviation a quantity of impure carbonate of potassa, which used to be called *salt of wormwood.*

ABSORBENTS (*Lat. Absorbeo,* I suck up). A term applied to medicines which are themselves inert or nearly so, but which absorb or combine with acid matters in the stomach and bowels: chalk and magnesia, in reference to such effect, are termed *absorbents.*

ACACIA (*Gr. ακη,* a point). The name of a genus of plants in the Linnæan system,—the Egyptian thorn. In the *London Pharmacopœia,* it is the *Acaciæ gummi,* or *gum arabic,* a species of gum which exudes from the bark of the *Acacia vera* (*Cl.* 23. *Ord.* 1. Polygamia Monœcia; *Nat. Ord.* Leguminosæ).

This tree is a native of Africa: it is low, crooked, and has a gray and purplish bark. The leaves are alternate, bipinnate, composed of several pairs of opposite pinnæ, with a small gland on the common petiole, between the base of each pair, and having numerous pairs of narrow, elliptical, smooth leaflets. On each side of the base of the leaves are two long diverging white spines. The flowers are hermaphrodite, and male, crowded into globular heads, which are supported on slender peduncles, and rise four or five together from the axillæ of the leaves: the calyx is small, bell-shaped, and five-toothed; the corolla is divided into five narrow yellow segments; the filaments are numerous, capillary, bearing roundish yellow anthers; the germen is conical, with a slender style, and simple stigma; and the pods, which are three or four inches long, and half an inch broad, contain several flattish, brown seeds.

Gum Acacia is imported, packed in casks, from Barbary and Morocco, in drops or tears, and in small fragments of a pale straw-colour, and more or less transparent or translucent. It is frequently mixed with what is known in the trade under the name of *gum Senegal,* also an African product, and probably indiscriminately collected from several trees.

Gum Arabic exhibits the chemical characters of pure gum. Its specific gravity is 1·35. It is tasteless, readily soluble in water, but insoluble in pure alcohol and ether. Its aqueous solution, if concentrated, is very little prone to change; if much diluted, it becomes acetous when kept. This solution is decomposed by subacetate of lead, and a precipitate is formed, composed of 186 parts of gum, and 112 of oxide of lead. The alkalies and diluted acids dissolve gum without change, but the concentrated acids decompose and alter it. Nitric acid converts a portion of it into mucic or saccholactic acid. The ultimate composition of gum may be represented as follows:—

	Atoms.	Equivalents.	Per Cent.			
Carbon . . .	13	78	41·94	=	Carbon . .	41·94
Hydrogen . .	12	12	6·45		Water . .	58·06
Oxygen . . .	12	96	51·61			
Gum	1	186	100·00			100·00

Gum Arabic is used to suspend different insoluble substances in water; hence it is often mixed with oils, resins, gum-resins, and the like. The *mistura acaciæ* (*mucilage of gum arabic*) of the Pharmacopœia, is made by dissolving the powdered gum in twice its weight of boiling water.

To allay the irritation excited by a cough, mixtures of mucilage and oil, or *emulsions*, are often of some service; and they may be rendered palatable, and even pleasant, by the addition of sugar and some very slight aromatic. Thus—

℞ Misturæ Acaciæ ℥j.
Olei Amygd.,
Syrup. Tolutani āā f℥ss.
Aquæ Cinnam. f℥ij.
—— destillat. f℥iv.
M.: fiat Mistur. cujus sumatur parum subinde.

Or, the diluted mucilage may be more simply prescribed as the vehicle of an expectorant; thus—

℞ Misturæ Acaciæ ℥ij.
Syrupi Mori, f℥j.
Aquæ Rosæ, f℥iij.
Tinct. Scillæ, fʒj.
M.: cochlearia duo vel tria ampla sumantur subinde.

Much has been said of the use of viscid mucilages in cases of poisoning by acrid substances, as a means of sheathing and protecting the alimentary canal; upon many occasions they appear to be useful as auxiliaries, although not to be depended on.

As an article of food, gum has been supposed by some to be very nutritious; by others it is represented as passing through the bowels unaltered: this, however, is not strictly true. During the gum-harvest, the Arabs are said to subsist almost exclusively upon it. Hasselquist states that a caravan of Abyssinians would have starved, had they not discovered amongst their merchandise a stock of gum arabic, upon which they lived for two months. But no carnivorous animal can be immediately brought to subsist upon food destitute of nitrogen: they require to be gradually inured to the change; and even then it is doubtful whether any animal can thrive, or even subsist for a long period, if limited to one article of diet. Thus, Tiedemann and Gmelin found that geese fed upon gum died on the sixteenth day; those fed on starch died on the twenty-fourth day; and those fed on boiled white of egg on the forty-sixth day; and in all these cases they gradually dwindled away and died, as if of starvation.

ACESCENTS (*Lat. Acescere*, to turn sour). Substances which readily run into acetous fermentation. Articles of diet which produce morbid acidity in the stomach.

ACETATES (*Lat. Acetum*, Vinegar). Salts formed by the union of acetic acid with bases. The following are contained in the *London Pharmacopœia*:—

Acetate of Ammonia (Liquor Ammoniæ acetatis), *see* AMMONIA.
Acetate of Potassa (Potassæ Acetas), *see* POTASSA.
Acetate of Soda (Sodæ Acetas), *see* SODA.
Acetate of Lead (Plumbi Acetas), *see* LEAD.
Diacetate of Lead (Liquor Plumbi diacetatis), *see* LEAD.
Acetate of Morphia (Morphiæ Acetas), *see* MORPHIA.
Diacetate of Copper (Diacetas cupri impura), *see* ÆRUGO.

Acetate of iron and *acetate of mercury* are contained in the *Edinburgh* and *Dublin Pharmacopœiæ*. *See* IRON and MERCURY.

ACETIC ACID: *Acidum Aceticum*. ACETUM: *Vinegar*. ACETUM FERMENTATIONE PARATUM: *Vinegar prepared by fermentation*. ACETUM DESTILLATUM: *distilled Vinegar*.

The acetic acid, like several others, requires to be considered under two points of view; *anhydrous*, or in combination with bases; and *hydrated*, or in combination with water: the anhydrous acid has not been obtained in an insulated or separate state; its equivalent is 51, and it is composed of

	Atoms.	Equivalents.	Per Cent.		
Carbon	4	24	47·06	Carbon	47·06
Hydrogen	3	3	5·88	Water	52·94
Oxygen	3	24	47·06		
Anhydrous Acetic Acid	1	51	100·00		100·00

The *hydrated acetic acid* consists of

	Atoms.	Equivalents.	Per Cent.
Anhydrous Acetic Acid	1	51	85
Water	1	9	15
Hydrate of Acetic Acid	1	60	100

This is sometimes termed *glacial acetic acid*, because it concretes into a crystalline mass when cooled down to about 40°, and retains its solid form even at higher temperatures. Its odour is pungent, and agreeable when diluted: it absorbs moisture from the atmosphere; it is a strong acid, and when applied to the skin, acts as a powerful rubefacient and irritant. The specific gravity of this acid is 1·063 at 60; but, as shown in the following table by Dr. Thomson, its density is not directly as its strength, so that the proportion of real acetic acid in any quantity of the dilute acid, can only be accurately ascertained by its saturating power.

Acid.	Water.	Sp. Grav. at 60.
1 atom +	1 atom	1·06296
1 — +	2 —	1·07060
1 — +	3 —	1·07080
1 — +	4 —	1·07132
1 — +	5 —	1·06820
1 atom +	6 atoms	1·06708
1 — +	7 —	1·06349
1 — +	8 —	1·05974
1 — +	9 —	1·05794
1 — +	10 —	1·05439

The liquid acetic acid, therefore, attains its *greatest density* when composed of 1 atom of anhydrous acid, and 4 atoms of water, or of about 100 of real acid, and 72 of water; and the density of the acid, containing only 1 atom of water, is nearly the same with that containing 7 atoms.

The equivalent of carbonate of lime (pure white marble, for instance,) is so near that of acetic acid, as to enable us to determine with sufficient accuracy for all practical purposes, the strength of acetic acid by the weight of a piece of white marble which it is capable of dissolving, and which is the direct equivalent of the anhydrous acetic acid.

The *acetic acid* of the Pharmacopœia is prepared as follows:—

ACIDUM ACETICUM.	ACETIC ACID.
℞ Sodæ Acetatis, libras duas, Acidi Sulphurici, uncias novem, Aquæ destillatæ, fluiduncias novem;	Take of Acetate of Soda, two pounds, Sulphuric Acid, nine ounces, Distilled Water, nine fluid ounces;
Sodæ acetati in retortam vitream immissæ acidum sulphuricum aquâ priùs mixtum adjice, tum balneo arenæ destillet acidum. Cavendum est ne calor sub finem nimis urgeatur.	To the acetate of soda put into a glass retort, add the sulphuric acid previously mixed with the water: then let the acid distil in a sand-bath. Care is to be taken, that the heat towards the end be not too great.
Hujus pondus specificum est 1·048. Sodæ carbonatis crystallorum gr. 87 a gr. 100 hujus acidi saturantur. Acido sodæ carbonate saturato et liquore consumpto, sodæ acetatis crystalli prodeunt. Cætera aceto destillato respondent.	Its specific gravity is 1·048. 87 grains of crystals of carbonate of soda are saturated by 100 grains of this acid. Saturated with carbonate of soda, and the liquor evaporated, crystals of acetate of soda are obtained. In other respects, it resembles *distilled vinegar.*

In this process, *acetate of soda* (in crystals) which consists of

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	23·3
Acetic Acid	1	51	37·3
Water	6	54	39·4
Crystals of Acetate of Soda	1	137	100·0

is decomposed by the action of the diluted sulphuric acid: sulphate of soda remains in the retort, and the acetic acid, together with a portion of water, pass over into the receiver; so that the product is in fact a *dilute acetic acid*, composed, according to Mr. Phillips, of 30·8 anhydrous acetic acid, and 69·2 water; for he finds that 100 grains of the acetic acid, prepared according to the above direction, saturate 87 grains of crystallized carbonate of soda; and 144 grains of crystallized carbonate of soda are equivalent to 51 of real acetic acid. Mr. Phillips further states that a mixture of 15 parts by weight of this acid, and 85 of water, is equal in strength to *distilled vinegar*.

ACETUM. *Vinegar.* "A yellowish liquid, of a peculiar odour, of which one fluid ounce is saturated by a drachm of crystals of carbonate of soda. Solution of chloride of barium being added, the precipitated sulphate of baryta does not exceed 1·14 of a grain. Hydrosulphuric acid being added, the colour is not changed."

There are many processes by which vinegar may be obtained. In wine countries it is procured by the exposure of wine to the action of air, and a due temperature: it is sometimes made from solutions of sugar and saccharine fruits; and in this country it is prepared from *wort*, or infusion of malt. In these instances the liquids are suffered to ferment: alcohol is first formed, and this, by the loss of hydrogen, passes into acetic acid.

The malt vinegar of commerce varies in strength and colour: according to the Pharmacopœia, a fluid ounce should be saturated by a drachm of crystallized carbonate of soda. It contains colouring matter, gum, starch, and gluten, and a small portion of alcohol, and frequently malic and tartaric acids (when made from wine), with traces of alkaline and earthy salts. According to Mr. Phillips, the strongest vinegar contains 5 per cent. of real acetic acid; but usually, not more than 4·6 per cent. A fluid ounce weighs about 446 grains, saturating 58 grains of carbonate of soda (crystallized), and two grains of it, making up the drachm, are allowed for saturating the sulphuric acid, (which Mr. Phillips states is permitted to be mixed with the vinegar,) and for decomposing the sulphates used in vinegar making. The precipitate of *sulphate of baryta*, afforded by adding chloride of barium to good vinegar, should not, according to the Pharmacopœia, exceed 1·14 grain from the fluid ounce, and the vinegar should not be discoloured by hydrosulphuric acid (solution of sulphuretted hydrogen).

ACETUM DESTILLATUM.	DISTILLED VINEGAR.
℞ Aceti congiun; Destillet acetum, balneo arenæ, ex retortâ vitreâ in receptaculum vitreum. Octarios septem primûm destillatos in usum serva.	Take of Vinegar a gallon; Let the vinegar be distilled in a sand-bath, from a glass retort into a glass receiver. Keep the seven first distilled pints for use.
NOTA.	NOTE.
Acetum Destillatum. Calore in vapores totum abit. Nihil ex eo demittitur, additâ vel plumbi acetate, vel argenti nitrate, vel potassii iodido. Nec acido hydrosulphurico neque ammoniâ adjectâ mutatur color. Argenti laminâ cum eo digestâ, nihil postea, acido hydrochlorico instillato, demittitur. Sodæ carbonatis crystallorum gr. 13 ab aceti destillati gr. 100 saturantur.	*Distilled Vinegar.* It is entirely evaporated by heat. Nothing is thrown down from it on adding either acetate of lead, or nitrate of silver, or iodide of potassium. Its colour is not altered by the addition either of hydrosulphuric acid or of ammonia. 13 grains of crystals of carbonate of soda are saturated by 100 grains of distilled vinegar.

The entire evaporation shows the absence of all solid matter: the succeeding tests are not very satisfactory, inasmuch as traces of vegetable matter which go over in distillation, are apt slightly to affect the nitrate of silver, and acetate of lead; they, however, indicate the absence of muriatic and sulphuric acid, when they give no white precipitate. Hydrosulphuric acid is a very delicate test of lead, and as the distillation of vinegar is often performed in a copper-still, with a pewter worm-pipe, it is frequently contaminated by that metal; the presence of copper is indicated by the blue tint which is produced by the addition of ammonia. Vinegar is sometimes said to be adulterated by nitric acid, and in that case it would dissolve silver-leaf, and afterwards yield a precipitate of chloride of silver, on the addition of a solution of chloride of sodium.

A very important source of acetic acid is the destructive distillation of wood, by which an impure vinegar, formerly called *pyroligneous acid*, is formed. From this an impure acetate (pyrolignate) of lime is manufactured, which after having been to a certain extent purified, is mixed with sulphate of soda; a double decomposition is thus effected, and sulphate of lime and acetate of soda are formed; the latter salt, being very soluble, is easily separated from the difficultly soluble sulphate of lime, purified by solution and crystallization, and decomposed in a proper distillatory apparatus, by sulphuric acid; a very pure and concentrated acetic acid passes over, and sulphate of soda remains, which is used up in the former part of the process. The *acetate of soda* included in the *Materia Medica* of the Pharmacopœia, and employed in the above process (page 7) for procuring acetic acid, is thus manufactured.

Medical uses of Acetic Acid, Vinegar, and Distilled Vinegar. As an article of the Materia Medica, concentrated acetic acid is chiefly valuable as a rubefacient stimulant; and as it is soluble in alcohol, and dissolves camphor, liniments of camphorated spirit of wine may be sharpened to any desired extent by the addition of concentrated acetic acid.

℞ Tincturæ Camphoræ f℥iij.
Acidi Acetici f℥j.
Misce fiant embrocatio parti affectæ applicanda.

To this any of the volatile oils may be added, for acetic acid also dissolves most of them, as we see in *aromatic vinegar*, which is the acid thus perfumed, and furnishes an agreeable nasal stimulant. According to Dr. Paris, Henry's Aromatic Vinegar is an acetic solution of camphor and of the oils of cloves, lavender, and rosemary. A preparation of this kind, he observes, may be extemporaneously made by putting ʒj. of acetate of potassa into a phial, with a few drops of some fragrant oil, and ♏xx. of sulphuric acid (*Pharmacologia*). Marseilles, or Thieves' Vinegar, consists of camphor, volatile oils, and vinegar, and resembles the *acetum aromaticum* of the *Edinburgh Pharmacopœia.*

A piece of blotting-paper, or cambric, moistened with acetic acid, and applied to the cuticle, soon excites heat and redness; and if suffered to remain upon the spot, the cuticle peels off. This forms a good occasional substitute for a blister, especially in inflammatory sore throat, where external irritation, rapidly excited, is often singularly effectual in alleviating the internal tumefaction and pain. It may also be useful in croup, where a quick external counteraction is wanted. The inhalation of the vapour of acetic acid has proved useful in hoarseness arising from local irritation of the larynx and epiglottis: it may be mixed in small quantity with boiling water in an inhaler, and used in the usual way.

The vapour of acetic acid is sometimes used for fumigation; but it is ineffectual as a destroyer of contagious or infectious matter.

Common vinegar, and acetic acid in various states of dilution, form a refreshing ingredient in diluent drinks in cases of fever, and in those affections of the digestive and urinary organs which are attended by the appearance of *white* deposits in the urine (phosphate of lime and ammoniaco-magnesian phosphate); but lemon and orange juice, or other acid fruits, are generally preferred. Distilled vinegar is a proper addition to lotions containing acetate of lead; diluted with rose or elderflower water, it does good in chronic ophthalmia; and it forms an useful addition to astringent gargles in relaxed uvula, and superficial inflammation of the posterior fauces. A glyster of diluted vinegar is sometimes used in typhus fever, and is an effective evacuant of the lower bowels.

℞ Aceti f℥ij.
Infusi Anthemidis f℥v.
M. pro enemate.

ACETOSELLA. *Oxalis Acetosella.* Wood-sorrel. *Cl.* 10. *Ord.* 5. Decandria Pentagynia. *Nat. Ord.* Geranea.

Wood-sorrel is an indigenous perennial, found in shady places, and flowering in April and May. It has a horizontal, fleshy, and toothed root, of a reddish colour; the leaves are radical, ternate, and petiolate, with the leaflets obcordate, very entire, hairy, of a yellowish-green colour, and purplish underneath. The flower-stalk is furnished with two scaly bractes, placed about an inch and a half beneath the flower, which is subnutant, delicate, and of a flesh-colour streaked with red. The calycine leaflets are oblong, oval, acute, ciliated, and purple at the tip. The corolla is bell-shaped, with the claws of the petals upright, and the borders obovate, rounded, and spreading: the filaments are somewhat connate at the base, and furnished with oblong, incumbent anthers, and the styles smooth, rising from an ovate germen. The capsule is membranous, and contains two seeds in every cell; each seed is invested with a fleshy white axil, at first smooth, and closed on every side, but at length, opening at the apex elastically, it rolls back, and throws off the seed with considerable force.

Wood-sorrel is an inodorous, acidulous plant, deriving its sourness from the presence of *quadroxalate of potassa.* This salt, prepared either from the juice of the plant, or by dropping a solution of potassa into a strong aqueous solution of oxalic acid, is sold under the name of *essential salt of lemons*, and used for removing stains and ironmoulds from linen; sometimes cream of tartar is substituted for it.

Wood-sorrel is not of much use, either in physic or cookery; the object of retaining it, therefore, in the Materia Medica of the Pharmacopœia, is by no means obvious. Boiled with milk, it forms a kind of whey, by some deemed antiscorbutic.

ACIDS. This term was originally applied to substances having a sour taste, reddening vegetable blue colours, and combining with bases so as to produce neutro-saline compounds; and it was presumed that they all contained oxygen. At present, the power of neutralising and definitely combining with salifiable bases is assumed as the essential characteristic of an acid. There are two leading classes of acids, namely: *oxyacids* and *hydracids;* the former consisting of oxygen, the latter of hydrogen, in combination with acidifiable bases; and the same bases often form both classes of acids: thus sulphur combined with oxygen forms *sulphuric acid;* combined with hydrogen, it forms *hydrosulphuric acid;* chlorine and oxygen form the *chloric acid;* chlorine and hydrogen form the *hydrochloric*, or muriatic acid. In these cases the acidifiable base is a simple or elementary substance; but in many cases it is a compound: thus, *cyanogen*, which is a compound of nitrogen and carbon, is the base of the cyanic and of the hydrocyanic acid, and various compounds of hydrogen and carbon, or of hydrogen carbon and oxygen, are the bases of the *organic* acids.

In medicine, the acids are an important class of remedies. Some of them, when duly diluted, are powerful tonics, astringents, and refrigerants; others are laxatives; and the hydrocyanic acid is a peculiar sedative.

The following are the acids included in the present *London Pharmacopœia:*—

Acetic Acid (Acidum Aceticum), *see* ACETIC ACID.
Arsenious Acid (Acidum Arseniosum), *see* ARSENIC.
Benzoic Acid (Acidum Benzoicum), *see* BENZOIN.
Citric Acid (Acidum Citricum), *see* CITRIC ACID.
Hydrochloric Acid (Acidum Hydrochloricum), *see* HYDROCHLORIC ACID.
Hydrocyanic Acid (Acidum Hydrocyanicum), *see* HYDROCYANIC ACID.
Nitric Acid (Acidum Nitricum), *see* NITRIC ACID.
Phosphoric Acid (Acidum Phosphoricum), *see* PHOSPHORUS.
Sulphuric Acid (Acidum Sulphuricum), *see* SULPHUR.
Tartaric Acid (Acidum Tartaricum), *see* TARTARIC ACID.

ACONITE (from *Acone*, a place in the Crimea celebrated for poisonous herbs). *Aconiti folia.* The leaves of the *Aconitum paniculatum. Cl.* 13. *Ord.* 3. Polyandria Trigynia. *Nat. Ord.* Ranunculaceæ.

This herbaceous perennial, frequently, from the shape of its flowers, termed *Monkshood*, grows wild in many parts of Europe, and is cultivated in our gardens and shrubberies. The stem is firm, elongated, five or six feet high, and terminating in the spike of flowers, racemose and branched below with single-flowered peduncles. The lower leaves are few, alternate, on long-channelled petioles, palmated, or rather pedate, being divided at the base into five broad cuneiform divisions, deeply cleft and toothed; the petioles are shorter, and the leaves less divided, the nearer they are to the summit of the stem: the colour of the whole is a deep green on the upper side, and a pale green on the under; both sides are smooth. The flowers are deep violet, and stand alternately on the spikes on unifloral erect axillary peduncles. They have no calyx, but two small erect calycinal stipulas are placed on each side of the peduncle, near the flower; the petals are five, the uppermost helmet-shaped and beaked, covering two singular peduncled nectaries: the lateral ones broad and roundish, the lower oblong, elliptical, and divaricating: these four are slightly pubescent. The nectaries are cucullated, the spur of each being hooked and blunt; the lip lanceolate, revolute, and bifid. The filaments are spread, and white at the base, where they closely cover the germens; but the upper part is filiform, purple, spreading, and bearing whitish anthers: the germens are three, four, or five, with simple reflective stigmas, and become capsules containing many angular seeds.

The leaves of aconite have little taste till long chewed, when they are acrid, and somewhat bitter, producing a tingling sensation upon the tongue, followed by some tumefaction, and greatly impairing the power of taste for some hours afterwards.

The activity of aconite, like that of most other eminently active and poisonous vegetables, appears to reside in a peculiar alkaloid, which is termed *aconitina*, and for the preparation of which the following directions are given in the *London Pharmacopœia*:—

ACONITINA.	ACONITINA.
℞ Aconiti Radicis exsiccati et contusi libras duas,	Take of the Root of Aconite, dried and bruised, two pounds,
Spiritûs rectificati congios tres,	Rectified Spirit, three gallons,
Acidi Sulphurici diluti,	Diluted Sulphuric Acid,
Ammoniæ Liquoris,	Solution of Ammonia,
Carbonis Animalis purificati, singulorum quantum satis sit.	Purified Animal Charcoal, of each as much as may be sufficient.
Aconitum cum spiritûs congio per horam coque in retortâ cui receptaculum aptatum est. Liquorem effunde; et quod restat cum altero spiritûs congio et spiritu recèns destillato iterùm coque, et liquorem etiam effunde. Idem tertiò fiat. Tum aconitum exprime, et liquoribus omnibus mixtis et colatis destillet spiritus. Quod restat ad idoneam extracti crassitudinem consume. Hoc in aquâ liqua, et cola. Liquorem leni calore consume ut, syrupo non absimilis, spissescat. Huic adjice acidi sulphurici diluti aquâ destillatâ mixti quantum satis sit ad aconitinam solvendam. Tandem ammoniæ liquorem instilla, aconitinamque demissam in aeido sulphurico diluto et aqua, ut ante, mixto liqua. Dein carbonem animalis admisce, subinde agitans in horæ partem quartam. Denique cola, atque ammoniæ liquore iterum instillato ut demittatur aconitina, lava et exsicca.	Boil the aconite for one hour with a gallon of the spirit, in a retort to which a receiver is adapted; pour off the liquor, and again boil the residue with another gallon of the spirit, and with that which had distilled over, and also pour off the liquor. Let the same be done for a third time. Then press out the aconite, and having mixed all the liquors, strain them, and distil off the spirit. Evaporate what remains to the proper consistency of an extract. Dissolve this in water, and strain. Evaporate the liquor by a gentle heat, till it acquires the consistency of syrup. To this, add a sufficient quantity of dilute sulphuric acid, mixed with water, to dissolve the aconitina. Then drop in the solution of ammonia, and dissolve the precipitated aconitina in dilute sulphuric acid and water, mixed as before. Afterwards mix the animal charcoal, occasionally shaking the mixture during a quarter of an hour. Lastly, strain, and again drop in solution of ammonia to precipitate the aconitina, which is to be washed and dried.

Aconitina is said to be more abundant in the root than in any other part of the plant, but successfully to extract it, a much larger quantity must be operated on than that directed by the Pharmacopœia, and a somewhat different process adopted. This alkaloid seems to have been first noticed in 1828, by Pallas, and was afterwards examined by Brandes and by Hesse, but its properties are as yet imperfectly ascertained; it has, however, an alkaline reaction, is intensely bitter, neutralises the acids, and contains nitrogen as one of its ultimate elements. When anhydrous, it has a gummy appearance, but in the state of *hydrate* it is white and pulverulent.

It is stated to be soluble in 150 parts of cold water, and abundantly soluble in alcohol and in ether; it is difficult to crystallize, inodorous, bitter, and acrid. It is intensely poisonous, and is especially active when applied to a wound; a twentieth part of a grain immediately killed a sparrow.

The medical uses of this alkaloid have been very imperfectly determined, and it seems rather prematurely introduced into the Pharmacopœia. It is said that an ointment, consisting of one grain of aconitina blended with one drachm of hog's-lard, has afforded relief in some cases of tic doloureux.

The only other preparation of this plant directed in the Pharmacopœia, is the *extract.*

EXTRACTUM ACONITI.	EXTRACT OF ACONITE.
℞ Aconiti foliorum recentium libram; contunde in mortario lapideo, insperso exiguo aquæ; dein exprime succum, eumque non defæcatum ad idoneam crassitudinem consume.	Take of fresh aconite leaves, a pound; bruise them, sprinkled with a little water, in a stone mortar; then press out the juice, and evaporate it, without straining (non defæcatum), to a proper consistency.

The activity of this extract, is, of course, referable to the aconitina which it contains, but in what state of combination has not been determined, though it is probably united with a vegetable acid.

The extract is of a dark-brown colour; it has a peculiar odour, and a bitter and somewhat pungent flavour; about five pounds of it are obtained from each hundred-weight of the fresh herb.

Aconite is an uncertain and dangerous remedy: it has gained some celebrity abroad in the cure of chronic rheumatism, a disease which, after prolonged attacks, often disappears spontaneously; hence, an infinity of medicines have had the merit of curing it; among these, aconite appears to have trifling claims, and as it sometimes is productive of alarming symptoms, it is better let alone. The extract, or inspissated juice, as it is sometimes called, is the only form in which it can conveniently be administered internally, and this is best given as a pill, either alone or with suitable adjuncts. The incipient dose should not exceed half a grain; sometimes ten grains have had no effect, probably because the extract was good for nothing: the symptoms it produces are nausea, sickness, pain in the region of the stomach, headach, and vertigo.

ACORUS CALAMUS (*Gr.* ακορον). *The Sweet Flag*, commonly called *Calamus Aromaticus*. *Cl.* 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Acorideæ.

This is a common plant in moist situations, as upon the banks of rivers, and the borders of pools and marshes. The *rhizoma*, or rootstock, is the part in which its most active qualities reside; it is flat, jointed, and sends off rootlets and fibres; it is of a reddish or brownish-yellow colour, and varies in thickness from a quarter of an inch to an inch; its interior, in the recent state, is pale blueish-white, tinged with brown and red exteriorly; its odour is aromatic, and its taste pungent and bitterish. The leaves are long, sword-shaped, sheathing one another, and commonly undulated on one side; the flowers, which are produced on a conical spike at the edge of the leaf, are small and numerous; there is no calyx; the corolla consists of six small concave petals; the filaments are thick, somewhat longer than the petals, and furnished with double anthers; the germen is gibbous, oblong, without a style, and terminated by a pointed stigma; the capsule is oblong, triangular, and divided into three cells containing numerous oval seeds.

When dry, the root has an agreeable aromatic odour, and a pungent and warm flavour. Its fracture is short and rough, and of a pale buff colour. When too old, it loses smell and taste, and is often wormeaten or mouldy.

Tromsdorff obtained from 100 parts of the fresh root,—

Volatile oil	0·1
Soft resin	2·3
Extractive with a little chloride of potassium	3·3
Gum, with phosphate of potassa	5·5
Starch	1·6
Woody fibre	21·5
Water	65·7
	100

The *volatile oil* has a peculiar odour, less agreeable than that of the root, and is sometimes in demand for perfumery. Some writers on the Materia Medica say that this root is less prescribed than it should be; but there are so many more agreeable and equally effectual aromatic tonics, that it is nevertheless rarely employed. The infusion, in the proportion of from one to two ounces of the bruised root to one pint of water, is the best form of administering it. Its aroma is dissipated by boiling. It may also be given in powder, in doses from ten grains to half a drachm or two scruples.

Dr. Paris states (*Pharmacologia*) that it is so favourite a remedy with the native practitioners of India, in the bowel complaints of children, that there is a penalty incurred by any druggist who will not, in the middle of the night, open his door and sell it if demanded; but Dr. Thomson observes (*Mat. Med.*) that the Indian *acorus* is not our plant, but a variety described by Willdenow under the name of *acorus verus*, which is also a native of Tartary, Poland, and Flanders.

The rhizoma of the *acorus calamus* is said to cure the intermittents of Norfolk; its infusion may be used as a vehicle for cinchona, or for sulphate of quinine; and it is a good stimulant tonic in flatulent dypepsia. The following are formulæ:—

℞ Acori contusi ℥j., infunde per horas quatuor in aquæ bullientis octario et cola.

℞ Infusi Acori, f℥jss
Quiniæ disulphatis, gr. ij.
Tinctur. Cinnam., fʒj.
M. : fiat haustus sextâ quaque horâ sumendus.

℞ Infusi Acori, ℥vss.
Pulveris Acori, ʒj.
Ammoniæ sesquicarbonatis, ʒss.
Syrupi Aurantii,
Spiritus Cinnamom. āā fʒij.
M. : fiat mistura de qua sumantur cochlearia duo vel tria ampla urgente flatulentiâ.

ADEPS. *The Lard of the Sus Scrofa, or Hog.* This is a very useful article in the formation of ointments, and the more tenacious and unctuous class of liniments. It combines with the fixed and volatile oils, with camphor, and with the resins. It fuses at a temperature of about 100°, and, like other varieties of fat, it appears to consist of an *oil* and a *suet* in combination, which may be imperfectly separated by pressure between folds of bibulous paper. Chevreul has called the former ingredient *elaine*, and the latter *stearine;* from the Greek words ελαιον and στεαρ, signifying *oil* and *tallow*. By long exposure to air, lard becomes rancid and sourish, and in that state it acquires certain solvent and oxidizing powers, which it did not before possess. It is generally sold in bladders, and often contains a considerable portion of salt, which, previous to its pharmaceutical employment, should always be carefully removed by washing it in repeated portions of water.

ÆRUGO. *Verdigris. Diacetas Cupri impura.* Impure Diacetate of Copper. This is the impure *subacetate of copper* of the former Pharmacopœia; in the *notes* it is said to be partially soluble in water, and almost entirely soluble either in ammonia, or, with the assistance of heat, in dilute sulphuric acid. Verdigris, as it usually occurs in commerce, is generally an impure, and consequently uncertain, preparation of copper, and might be omitted in the list of the Materia Medica. It is prepared by exposing thin sheet copper to the fumes of vinegar or sour wine lees; or by alternating copper plates with pieces of woollen cloth dipped in acetic acid; the encrusting acetate is scraped off, made into a paste with vinegar, and pressed into moulds: it is usually in masses of a variegated blue-green colour. It is a hydrated salt, and when pure, forms small silky crystals, composed of

	Atoms.	Equivalents.	Per Cent.
Oxide of Copper	2	80	43·24
Acetic Acid	1	51	27·57
Water	6	54	29·19
Hydrated Diacetate of Copper	1	185	100·00

Mr. Phillips states the following as the composition of the three varieties of verdigris which occur in commerce (*Ann. of Phil.*, 2 Series, VI., 39.) :—

	Blue Crystals.	French Verdigris.	English Verdigris.
Acetic Acid	28·30	29·3	29·62
Peroxide of Copper	43·25	43·5	42·25
Water	28·45	25·2	25·05
Impurity	—	2	0·62
	100	100	100

If an acetate of copper for medical use be required, the *crystallized verdigris* should be employed, which is a neutral salt, composed of,—

	Atoms.	Equivalents.
Oxide of Copper	1	40
Acetic Acid	1	51
Water	1	9
Crystallized Acetate of Copper	1	100

As far, however, as all pharmaceutical purposes are concerned, *sulphate of copper* may be substituted. Independent of the adulterations to which common verdigris is subject, there is a substance occasionally found in trade, under the name of *English verdigris*, which is made by triturating acetate of lead and sulphate of copper with a certain quantity of chalk and water; the mixture is dried in cakes, and grape-stalks added *ad libitum.*

The *London Pharmacopœia* directs the old *mel Ægyptiacum*, or *oxymel æruginis*, under the title of *linimentum æruginis*, and this is certainly a useful detergent application to some ulcerating sores; but a solution of sulphate of copper in common oxymel is a preferable substitute. The following is the formula:—

LINIMENTUM ÆRUGINIS.

℞ Æruginis contritæ unciam,
Aceti fluiduncias septem,
Mellis uncias quatuordecim;

Liqua æruginem in aceto et per linteum cola; dein, instillato melle, ad idoneam crassitudinem decoque.

LINIMENT OF VERDIGRIS.

Take of Verdigris powdered, one ounce,
Vinegar, seven fluid ounces,
Honey, fourteen ounces;

Dissolve the verdigris in the vinegar, and strain through a linen cloth; afterwards add the honey, and boil down to a proper consistence.

According to Dr. Paris, powdered verdigris is the active ingredient in the quack medicine called *Smellome's Eye-Salve*, which may be imitated by rubbing half a drachm of finely-powdered verdigris with a little oil, and then mixing it with an ounce of yellow basilicon. An ointment composed of one drachm of finely-powdered verdigris with one ounce of lard, or of spermaceti ointment, is sometimes useful in cutaneous affections, especially in psoriasis or tetter.

ÆTHER, or ETHER. This term is applied to a variety of products usually obtained by distilling mixtures of alcohol and acids; the composition of the product differs according to the acid employed, in some cases containing the acid or its elements, and in others, not containing them. The *æther sulphuricus* of the Pharmacopœia is of the latter description; it contains no sulphuric acid, and is simply designated as

Ether, whilst the ethers which include acids are distinguished by the name of the acid employed, as *nitrous ether*, *acetic ether*, &c.

Under the head *Ætherea* (preparations of ether), in the Pharmacopœia, directions are given for the preparation of *sulphuric ether* (æther sulphuricus), *ethereal oil* (oleum æthereum), *compound spirit of sulphuric ether* (spiritus ætheris sulphurici compositus), and *spirit of nitric ether* (spiritus ætheris nitrici).

ÆTHER SULPHURICUS.

℞ Spiritus rectificati libras tres,
Acidi Sulphurici libras duas,
Potassæ Carbonatis prius ustæ unciam;

Spiritus libras duas retortæ vitreæ infunde, eique acidum adjice, et misce. Dein in arenam impone, et calorem auge, ita ut quamprimum ebulliat liquor, transeatque æther in vas recipiens glacie vel aqua refrigeratum. Destillet liquor donec pars aliqua gravior transire incipiat. Liquori qui restat in retorta, calore prius imminuto, reliquum spiritum affunde, ut simili modo destillet æther. Liquores distillatos conjunge, tum partem supernatantem effunde, eique adjice potassæ carbonatem, subinde per horam agitans. Denique ex retorta ampla destillet æther, et in vase obturato servetur.

NOTA.

Æther Sulphuricus.—Hujus pondus specificum est 0·750. Aëre in vapores totus abit. Fluctuat autem venalis inter 0·733 et 0·765. Lacmum rubro colore leviter inficit; cum aquâ parcè coit, et limpidus perstat; scilicet ratione fluidunciæ in aquæ octario dimidio.

SULPHURIC ETHER.

Take of Rectified Spirit, three pounds,
Sulphuric Acid, two pounds,
Carbonate of Potassa, previously ignited, one ounce;

Pour two pounds of the spirit into a glass retort, and then add the acid, and mix. Then place it on sand, and raise the heat so that the liquor may quickly boil, and the ether pass over into a receiver refrigerated by ice or water. Let the liquor distil till a heavier portion begins to pass over. To the liquor which remains in the retort, after the heat has diminished, pour in the remainder of the spirit, that ether may distil in the same manner. Mix the distilled liquors; then pour off the supernatant part, and add to it the carbonate of potash, shaking them occasionally during an hour. Lastly, let the ether distil from a large retort, and be kept in a stoppered vessel.

NOTE.

Sulphuric Ether.—Its specific gravity is 0·750. What is sold, fluctuates between 0·733 and 0·765. It totally evaporates in the air. It reddens litmus slightly; it combines sparingly with water, for example, in the proportion of a fluid ounce to half a pint, and remains limpid.

In the above process, alcohol is converted into ether by the action of sulphuric acid; but the produced ether neither contains sulphuric acid nor its elements: the theory of the transmutation, therefore, is independent of the decomposition of the acid. Alcohol, in its purest or anhydrous state, is composed of,—

	Atoms.	Equivalents.	Per Cent.
Carbon	2	12	52·18
Hydrogen	3	3	13·04
Oxygen	1	8	34·78
Alcohol	1	23	100·00

Ether, in a state of purity, consists of,—

	Atoms.	Equivalents.	Per Cent.
Carbon	4	24	64·87
Hydrogen	5	5	13·51
Oxygen	1	8	21·62
Ether	1	37	100·00

In reference to the above equivalents, it is obvious that the atom of ether contains twice as much carbon as the atom of alcohol, and therefore two atoms of alcohol are required for the formation of one atom of ether. Two atoms of alcohol contain,—

	Atoms.
Carbon	4
Hydrogen	6
Oxygen	2
Alcohol	2

from which, if we deduct 1 atom of hydrogen, and 1 atom of oxygen, we leave the remaining elements in such proportions as to constitute 1 atom of ether. Now 1 atom of hydrogen and 1 atom of oxygen, are equivalent to 1 atom of water; hence it may be stated, that 2 atoms of alcohol, *minus* 1 atom of water, are equivalent to 1 atom of ether. So that it would appear, that the process of etherification resolves itself into the simple fact of the abstraction of 1 atom of water from 2 atoms of alcohol. But how does the sulphuric acid effect this?

As sulphuric acid is known to possess a strong attraction for water, it was at first supposed that it merely and directly abstracted from the alcohol the requisite proportion of water; but this is not the case, for on mixing sulphuric acid with alcohol, the properties of the acid, and its saturating power, are fundamentally changed; and this change depends upon its combination with alcohol to form a peculiar acid, which has been termed *sulphovinic acid*, and which may be regarded as a compound of

	Atoms.	Equivalents.
Alcohol	2	46
Sulphuric Acid	2	80
Sulphovinic Acid	1	126

and which therefore consists of

	Atoms.	Equivalents.		Atoms.	Equivalents.
Carbon	4	24	= Alcohol	2	46
Hydrogen	6	6			
Oxygen	2	16			
Sulphuric Acid	2	80		2	80
Sulphovinic Acid	1	126		1	126

Such being the composition of the sulphovinic acid (or *sulphate of alcohol*), it appears that, at a definite temperature, its elements are so arranged as to constitute sulphuric acid, water, and ether; or, in other words, that 1 atom of sulphovinic acid is resolved into 2 atoms of sulphuric acid, 1 atom of water, and 1 atom of ether, which may be represented thus:—

	Atoms.		Atoms.	Equivalents.	Equivalents.
Sulphuric Acid	2				80
Water	1	Hydrogen	1	1	= 9
		Oxygen	1	8	
Ether	1	Carbon	4	24	= 37
		Hydrogen	5	5	
		Oxygen	1	8	
Sulphovinic Acid	1				126

To elucidate the theory of etherification in all its details, would require more space than can here be allotted to it, and would involve chemical details inconsistent with the object of this work. I have therefore selected, for the information of the pharmaceutical reader, that view of the subject which appears least complicated with other considerations, and must refer such as are desirous of more minute information, to chemical writers, and more especially to the view which I have given of the subject in my *Manual of Chemistry.*

Ether, as obtained by the Pharmacopœia process, is a transparent colourless liquid, of a penetrating and agreeable odour, and a pungent and sweetish taste. It is exhilarating, and produces a species of intoxication when its vapour is respired mixed with air. Its boiling point, under mean pressure, is about 98°, and it is so volatile that at common temperatures it cannot be poured from one vessel to another without sustaining loss by evaporation: its vapour is highly inflammable, so that much caution is requisite in regard to the approach of flame. Its vapour is extremely heavy, its density, compared with that of air, being as 2·58 to 1·00. The bulk of liquid ether is greatly influenced by temperature; 1000 parts at the temperature of 95° (which is near its boiling point), contracting to 968 parts at 60°, and to 948 parts at 32°. It is doubtful whether pure ether is capable of congelation. When inflamed it burns away with a bright and slightly sooty flame, leaving no residue, and producing carbonic acid and water. Exposed to light, and to the occasional access of air, as in a bottle which is often opened, it becomes sour, from the formation of a little acetic acid; and when long kept, its properties are further modified. It is soluble in about nine parts, by measure, of water; and ether which has been agitated with water retains about a tenth of its volume of that fluid. It mixes in all proportions with alcohol, and the *spiritus etheris sulphurici* of the former Pharmacopœia was a useful solution of this kind, formed by mixing one part of ether with two of rectified spirit. This preparation is now omitted by the college.

Ether is a very powerful and diffusible, but at the same time a transient stimulus, acting upon the brain nearly in the same way as alcohol, and therefore, to a certain extent, narcotic. In many instances it also proves antispasmodic; it is, however, most frequently administered in combination with alcohol, as in the *compound spirit of ether.*

A teaspoonful or more of undiluted ether has been successfully given in the cure of intermittent fever, immediately previous to the accession of the cold fit: it occasions a powerful shock to the system, momentarily taking away the breath, and giving great anxiety and uneasiness for a few seconds; but the febrile paroxysm is not unfrequently checked in its progress, and the disease has sometimes altogether disappeared; the practice, however, is by no means commendable. Hysterical fits, and even epilepsy, are said to have been successfully treated in the same way. In nervous fever, particular symptoms are often relieved by ether, and in a variety of spasmodic diseases it is advantageously employed, especially in cramp and tetanic affections, and in the paroxysm of spasmodic asthma; in the latter case, and in catarrhal dyspnœa, the inhalation of the vapour of ether has been recommended; but the practice is not always safe, especially where determination of blood to the head is to be apprehended.

The usual dose of ether is from twenty minims to two fluidrachms, and it is usually prescribed in conjunction with other antispasmodics, especially camphor. The following is a very effectual form, applicable in any case of violent spasm: as the effect of ether is but transient, the dose should be repeated every hour, or every two or three hours, according to the effect produced, and to the severity of the symptoms.

℞ Ætheris Sulphurici f℥ss.
Misturæ Camphoræ f℥vij.
Syrupi Croci f℥ss.
Fiat mistura, cujus sit dosis cochlearia tria ampla.

In the disease commonly called nervous headach, unattended by vascular fulness, and allied to general debility of the nervous system, the following has proved effective:—

℞ Ætheris Sulphurici,
Liquoris Ammoniæ, āā fʒss.
Misturæ Camphoræ f ʒx.
Tinct. Cardam. comp. f ʒj.
Misce pro haustu bis vel ter die sumendo.

A small teaspoonful of ether in a glass of white wine is often an effectual remedy in allaying the distressing symptoms of sea-sickness, and in restoring the tone of the stomach after it.

Ether is applied externally as a refrigerant and stimulant; it produces the former effects by the facility and rapidity with which it evaporates. A little poured into the hand and held near the eye stimulates that organ, and is supposed to be useful in incipient corneal opacity. In all these applications of ether, great care should be taken to avoid the proximity of fire.

OLEUM ÆTHEREUM.	ETHEREAL OIL.
℞ Spiritûs rectificati libras duas, Acidi Sulphurici libras quatuor, Liquoris Potassæ, Aquæ destillatæ, singulorum fluidunciam vel quantum satis sit.	Take of Rectified Spirit two pounds, Sulphuric Acid four pounds, Solution of Potash, Distilled water, of each a fluid ounce, or as much as may be sufficient.
Spiritui acidum caute admisce. Destillet liquor donec spuma nigra succrescat, tum protinus ab igne retortam remove. Liquorem supernatantem leviorem a graviori separa, eumque aëri in diem expone. Huic liquorem potassæ aqua prius mixtum, adjice, et simul agita. Denique oleum æthereum bene lotum quod subsederit separa.	Mix the acid cautiously with the spirit. Let the liquor distil until a black froth arises, then immediately remove the retort from the fire. Separate the lighter supernatant liquor from the heavier one, and expose the former to the air for a day. Add to it the solution of potash, first mixed with water, and shake them together. Lastly, when sufficiently washed, separate the ethereal oil which subsides.
NOTA.	NOTE.
Oleum Æthereum. Odore proprio, minimè acri fruitur; in æthere sulphurico totum liquatur et nullam vim acidam in lacmum exercet. Hujus pondus specificum est 1·05.	*Ethereal Oil.* It has a peculiar slightly acrid odour, is entirely soluble in sulphuric ether, and exerts no acid power upon litmus. Its specific gravity is 1·05.

The object of this process is to obtain the product formerly called *oil of wine*, which appears from Hennell's experiments to be a *sulphate of hydrocarbon.* The real nature of the compound, however, obtained by the preceding process, has not been accurately ascertained, as will appear from the statements to which I have referred in the *Manual of Chemistry.*

Ethereal oil is not used alone, and the only preparation into which it enters is *Hoffmann's anodyne liquor*, or, in the present Pharmacopœia, the *compound spirit of sulphuric ether.*

SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS.	COMPOUND SPIRIT OF SULPHURIC ETHER.
℞ Ætheris Sulphurici fluiduncias octo, Spiritûs rectificati fluiduncias sedecim, Olei Ætherei fluidrachmas tres. Misce.	Take of Sulphuric ether eight fluid ounces, Rectified Spirit sixteen fluid ounces, Ethereal Oil three fluid drachms. Mix.

As far as the mixture of the ether and alcohol is concerned, this is a useful form, but the ethereal oil merely gives it a peculiar flavour, without modifying its activity; and as the uncertain process for ethereal oil is only retained in the present Pharmacopœia for the purpose of this formula, both might, without inconvenience, have been omitted, provided the "Spiritus Ætheris Sulphurici," above alluded to, of the former Pharmacopœia, had been retained.

The medical uses of the *spiritus ætheris sulphurici compositus* are analogous to those of ether. Half a drachm to a drachm and a half is the medium dose. In faintness, low spirits, and generally as a nervine stimulant, it is prescribed, as in the following nervous mixture; compound spirit of lavender and syrup of red poppies being occasionally substituted for the compound spirit of ammonia and syrup of saffron, and pennyroyal-water for the camphor mixture.

℞ Misturæ Camphoræ f℥vij.
Spiritûs Ætheris Sulphurici compos.,
——— Ammoniæ compos. āā fʒij.
Syrupi Croci f℥ss.
Fiat mistura nervina, de qua sumantur cochlearia tria vel quatuor magna, urgente agitatione.

ÆTHER, NITRIC. This ether is not directed in our Pharmacopœia, but its alcoholic solution is employed under the name of *spirit of nitric ether.*

SPIRITUS ÆTHERIS NITRICI.	SPIRIT OF NITRIC ETHER.
℞ Spiritûs rectificati libras tres Acidi Nitrici uncias quatuor, Spiritui acidum paulatim adjice et misce; tum destillent fluidunciæ triginta duo.	Take of Rectified Spirit three pounds, Nitric Acid four ounces. Add the acid gradually to the spirit, and mix; then let thirty-two fluid ounces distil.
NOTA.	NOTE.
Spiritus Ætheris Nitrici. Hujus pondus specificum est 0·834. Lacmi colorem in rubrum levitèr mutat. Sodæ carbonate adjectâ, nullæ prodeunt acidi carbonici bullulæ. Quinetiam odore proprio dignoscitur.	*Spirit of Nitric Ether.* Its specific gravity is 0·834. It slightly changes the colour of litmus to red. Carbonate of soda being added, no bubbles of carbonic acid are produced. Moreover it is distinguished by a peculiar odour.

This compound may be regarded as a solution of hyponitrous ether in alcohol. Hyponitrous ether (*Manual of Chemistry*, p. 1099) is a compound of ether (sulphuric) and hyponitrous acid; it consists of

	Atoms.	Equivalents.	Per Cent.
Ether	1	37	49·4
Hyponitrous Acid	1	38	50·6
Hyponitrous Ether	1	75	100·0

Spirit of nitric ether is the *spiritus nitri dulcis*, or sweet spirit of nitre, of old pharmacy. It is colourless, and has a very peculiar and agreeable odour and flavour. It is inflammable and volatile, and is always slightly acid, especially after long keeping. When it is so acid as to dissolve carbonate of soda with effervescence, or to act powerfully on litmus paper, it should be rejected. It mixes in all proportions with water and alcohol. If its specific gravity exceeds ·834 it is apt to contain water, or excess of acid, or both. When tincture of guaiacum is dropped into it, a fine and very peculiar blue tint is produced, which soon passes into various shades of green, but the mixture remains transparent: when water is added, a blue or green precipitate falls, which eventually becomes brown.

Spirit of nitric ether is diuretic and antispasmodic; and, conjoined with proper regimen, it also proves diaphoretic. Half a drachm to a drachm is the usual dose; it is sometimes given in low febrile affections, with saline remedies.

℞ Spiritûs Ætheris Nitrici f ʒiij.
Liquoris Ammoniæ Acetatis f ℥j.
Misturæ Camphoræ f ℥ivss.
Syrupi Zingiberis f ʒij.
Fiat mistura, cujus capiat cochlearia tria ampla subinde.

As a diuretic in dropsical affections, it is conjoined with other diuretics, such as acetate of potassa, nitre, squills, digitalis, &c.

℞ Infusi Armoraciæ compos. f ℥iss.
Spiritûs Ætheris Nitrici,
Syrupi Zingiberis, āā f ʒj.
Tincturæ Scillæ ♏xx.
Fiat haustus ter die sumendus.

℞ Infusi Digitalis f ʒiv.
Aquæ Cinnamomi f ʒv.
Potassæ Acetatis ℈j.
Spiritûs Ætheris Nitrici f ʒi.
M.: fiat haustus sextâ quâque horâ sumendus.

℞ Potassæ Acetatis ʒss.
Misturæ Camphoræ,
Infusi Quassiæ, āā f ʒvj.
Syrupi Rhæados,
Spir. Æther. Nitr. āā f ʒj.
Tincturæ Digitalis ♏vj.
Fiat haustus ter in die sumendus.

The following often allays the troublesome tickling sensation in the throat which attends a common catarrh, but the mixture is very apt to ferment.

℞ Oxymellis f℥j.
Syrupi Papaveris,
Spiritûs Ætheris Nitric. āā f℥ss.
Fiat mistura, cujus sumatur pauxillum subinde.

ALCOHOL. A term of Arabian origin, applied by the alchemists to highly-rectified spirit of wine. In chemistry and pharmacy, the term *alcohol*, or *absolute alcohol*, is used to denote a definite compound of carbon, hydrogen, and oxygen, obtained by depriving the *rectified spirit* of commerce of its adhering water. The following is the Pharmacopœia formula for this purpose :—

Alcohol.	Alcohol.
℞ Spiritus rectificati congium, Calcii Chloridi libram ; Spiritui calcii chloridum injice, et ubi liquefactum fuerit, destillent octarii septem et fluidunciæ quinque.	Take of Rectified Spirit, one gallon, Chloride of Calcium, one pound ; Put the chloride of calcium into the spirit, and when it has dissolved, let seven pints and five fluid ounces distil.
Nota.	Note.
Alcohol. Hujus pondus specificum est ·815; coloris expers est; calore in vapores abit; cum aquâ et cum æthere coit; vinum sapit et olet.	*Alcohol.* Its specific gravity is ·815 ; it is colourless ; it evaporates when heated ; mixes with water and with ether ; tastes and smells of wine.

In the above process, the chloride of calcium abstracts and retains nearly the whole of the water contained in the rectified spirit, whilst the alcohol distils over.

The *rectified spirit* (spiritus rectificatus) of the Pharmacopœia is directed to be of the specific gravity ·838, and may be regarded as a mixture of about 82 parts of absolute alcohol and 18 of water. In the above formula, the chloride of calcium is used to abstract and retain the water, while the pure alcohol distils over. A better process for the purpose consists in agitating together equal weights of rectified spirit and quicklime, leaving the mixture for twenty-four hours, and then distilling it slowly at a temperature not exceeding 212° ; the first portions which pass over are pure alcohol.

Alcohol is a limpid colourless liquid, of a vinous smell and flavour, and may be obtained of a specific gravity of ·791 at 60°. It seems uselessly introduced into the Pharmacopœia, since the "rectified spirit" is sufficiently pure and strong for all pharmaceutical purposes. Its boiling point, under mean atmospheric pressure, is about 173°, or 176° when its specific gravity is ·820. It has never been frozen, and hence is commonly employed in the construction of thermometers intended to measure low temperatures : but the unequal contraction of alcohol which is more or less pure, renders the instruments in which it is used of doubtful accuracy ; hence sulphuret of carbon, or highly-rectified naphtha, have been suggested as preferable for that purpose. One volume of liquid alcohol yields 488 volumes of vapour at the temperature of 212° ; the density of alcohol vapour being to that of air as 1600 to 1000. The expansibility of alcohol by heat is such, that 1000 parts at 50° (of the specific gravity of ·817) become 1079 parts at 170°. At 110° (half-way between the above extremes) the volume was 1039, or half a division below the true mean. There is a strong attraction between alcohol and water; and when mixed with water, heat is evolved: equal measures of alcohol and water, each at 50°, produce, when suddenly mixed, a temperature of 70°; and equal measures of proof spirit and water produce a temperature of 60°. The diminution of bulk in these cases is such, that when 50 measures of alcohol and 50 of water are mixed, it amounts to 3·745 per cent.

The *spiritus tenuior* of the Pharmacopœia, or the *proof spirit* of commerce, is of the specific gravity of ·920 at 62°, and may be regarded as a mixture of equal *weights* of pure alcohol and water. The value or strength of alcohol and of proof spirit, and indeed of all mixtures of alcohol and water, is best determined by their *specific gravity;* numerous tables have been constructed, showing the composition of such mixtures at various densities and temperatures; of these tables, the most extended are those published in the *Philosophical Transactions* for 1794; but the following table by Lowitz will be found most convenient for pharmaceutical use. It shows the *weight* of absolute alcohol (specific gravity ·7960 at 60°) contained in diluted alcohol of different specific gravities.

100 Parts.		Sp. Gravity.		100 Parts.		Sp. Gravity.		100 Parts.		Sp. Gravity.	
Alc.	Wat.	At 68°.	At 60°.	Alc.	Wat.	At 68°.	At 60°.	Alc.	Wat.	At 68°.	At 60°.
100	0	0·791	0·796	66	34	0·877	0·881	32	68	0·952	0·955
99	1	0·794	0·798	65	35	0·880	0·883	31	69	0·954	0·957
98	2	0·797	0·801	64	36	0·882	0·886	30	70	0·956	0·958
97	3	0·800	0·804	63	37	0·885	0·889	29	71	0·957	0·960
96	4	0·803	0·807	62	38	0·887	0·891	28	72	0·959	0·962
95	5	0·805	0·809	61	39	0·889	0·893	27	73	0·961	0·963
94	6	0·808	0·812	60	40	0·892	0·896	26	74	0·963	0·965
93	7	0·811	0·815	59	41	0·894	0·898	25	75	0·965	0·967
92	8	0·813	0·817	58	42	0·896	0·900	24	76	0·966	0·968
91	9	0·816	0·820	57	43	0·899	0·902	23	77	0·968	0·970
90	10	0·818	0·822	56	44	0·901	0·904	22	78	0·970	0·972
89	11	0·821	0·825	55	45	0·903	0·906	21	79	0·971	0·973
88	12	0·823	0·827	54	46	0·905	0·908	20	80	0·973	0·974
87	13	0·826	0·830	53	47	0·907	0·910	19	81	0·974	0·975
86	14	0·828	0·832	52	48	0·909	0·912	18	82	0·976	0·977
85	15	0·831	0·835	51	49	0·912	0·915	17	83	0·977	0·978
84	16	0·834	0·838	50	50	0·914	0·917	16	84	0·978	0·979
83	17	0·836	0·840	49	51	0·917	0·920	15	85	0·980	0·981
82	18	0·839	0·843	48	52	0·919	0·922	14	86	0·981	0·982
81	19	0·842	0·846	47	53	0·921	0·924	13	87	0·983	0·984
80	20	0·844	0·848	46	54	0·923	0·926	12	88	0·985	0·986
79	21	0·847	0·851	45	55	0·925	0·928	11	89	0·986	0·987
78	22	0·849	0·853	44	56	0·927	0·930	10	90	0·987	0·988
77	23	0·851	0·855	43	57	0·930	0·933	9	91	0·988	0·989
76	24	0·853	0·857	42	58	0·932	0·935	8	92	0·989	0·990
75	25	0·856	0·860	41	59	0·934	0·937	7	93	0·991	0·991
74	26	0·859	0·863	40	60	0·936	0·939	6	94	0·992	0·992
73	27	0·861	0·865	39	61	0·938	0·941	5	95	0·994	
72	28	0·863	0·867	38	62	0·940	0·943	4	96	0·995	
71	29	0·866	0·870	37	63	0·942	0·945	3	97	0·997	
70	30	0·868	0·872	36	64	0·944	0·947	2	98	0·998	
69	31	0·870	0·874	35	65	0·946	0·949	1	99	0·999	
68	32	0·872	0·875	34	66	0·948	0·951	0	100	1·000	
67	33	0·875	0·879	33	67	0·950	0·953				

Alcohol burns with a pale blue flame, producing intense heat, and no smoke or soot; the products of its combustion are carbonic acid and water, and by the careful determination of the weights of these products obtained by the combustion of a given weight of alcohol, the relative proportions of its ultimate elements have been found as follows:—

	Atoms.	Equivalent Numbers.	Theory.	Experiment. Dumas and Boullay.
Carbon	2	12	52·18	52·17
Hydrogen	3	3	13·04	13·31
Oxygen	1	8	34·78	34·52
Alcohol	1	23	100·00	100·00

Upon this view of the subject, the equivalent of the atom of alcohol is 23, and it may be regarded as a *hydrate* of that form of hydrocarbon which has been termed *olefiant gas*, as shown in the following table:—

	Atoms.		Atoms.	Equiv. Nos.	Per Cent.
Carbon	2	Olefiant Gas	1	14	60·7
Hydrogen	2				
Hydrogen	1	Water	1	9	39·3
Oxygen	1				
Alcohol	1		1	23	100·0

But some chemists, in reference to the composition of ether, (*see* Æther,) have been induced to double the above equivalent of alcohol (making it 46 instead of 23), and to consider it as a *bihydrate* of that form of hydrocarbon which has been called *etherine;* in this case its composition will stand as below:—

	Atoms.		Atoms.	Equivalent Numbers.	Per Cent.
Carbon	4	Etherine	1	28	60·7
Hydrogen	4				
Hydrogen	2	Water	2	18	39·3
Oxygen	2				
Alcohol	1		1	46	100·0

Alcohol, from its solvent powers, is an important pharmaceutical agent; it dissolves the greater number of the alkaloids, resins, essential oils, and soaps, and several of the fixed oils. When diluted, as in the state of *proof spirit*, it is a good vehicle for the active ingredients of many vegetable substances; hence its applications in the form of *tinctures.* Medicinally considered, it is a valuable, but often mischievous,stimulant: it is always employed more or less diluted, as in the form of proof spirit, brandy, rum, and similar spirituous liquors, or of wine. It is used externally as a stimulant; and occasionally as a refrigerant, in consequence of the cold which is produced by its evaporation.

As remedial agents, spirituous liquors quicken and fill the pulse, and elevate the sensible and thermometric heat of the body; they stimulate the brain and nervous system, and inebriate, or poison, when taken in excess, producing determination of blood to the head, wandering of the mind, great general excitement, succeeded by drowsiness and more or less insensibility, and afterwards headach and sickness. When taken in excessive quantity, fatal apoplexy, or coma, supervene, or death ensues from some more accidental cause, such as a fall, or suffocation during vomiting. In such cases, it sometimes happens that the patient may rally from the primary effects of the debauch, and then become delirious, and comatose, or sudden and fatal lethargy, may supervene. There are also cases on record, in which large quantities of the stronger spirituous liquors have been taken at one draught and undiluted, as for a wager, or some similar folly; in such cases, profound coma soon comes on, with stertorous breathing, and death often ensues, either almost immediately or in a few hours.

But if the habitual drunkard be not thus suddenly carried off by the consequence of his excesses, he becomes the prey of other forms of disease, such as tuberculated liver, and other local organic disorders, or epileptic, or maniacal, or falls into a state of delirium, accompanied by tremors of the hands and limbs, succeeded by coma, or by furious mania, which, if not of immediate fatal termination, ends in the most miserable and melancholy of all forms of what is called slow death. In these cases, the membranes of the brain are found, upon examination after death, to be more or less inflamed, and there is generally serous effusion; and the mucous coat of the stomach is in a pulpy state. All these forms of disease, and every modification of slow and rapid poisoning by alcohol, are now unfortunately too familiar to the medical practitioner, in consequence of the prevalence of gin-drinking; but they assume a variety of complicated aspects, as will be observed by reference to the numerous cases which have been published, dependent upon various pre-existent diseases or tendencies to disease; and, in the lower orders, are aggravated by the usual concomitants of poverty.

It is not my object here to consider in detail the manner in which alcohol acts, or the treatment which is best adapted to the relief of habitual inebriety. Sir Benjamin Brodie's experiments have rendered it probable that its principal effects are produced through the medium of the nerves upon the brain (*Phil. Trans.*, ci. 118.); others conceive that it is absorbed, and enters the blood (*Christison on Poisons*, chapter xli.), and have founded this opinion upon the smell of the breath, and upon its deleterious influence when injected into the cellular tissue.

The treatment of *drunkenness*, and its consequences, may be considered under two heads: 1. occasional; 2. habitual. Cases of the former kind, resulting from great excess of wine, which is a dilute, and, in some respects, peculiar form of alcohol, generally relieve themselves by vomiting; but where this does not effectually ensue, and where the stupor is continuous or alarming, the stomach-pump should be resorted to; yet even an occasional or accidental debauch, in habits predisposed to certain diseases, sometimes proves fatal, or lays the foundation of a fatal consequence, such as cerebral inflammation, apoplexy, or inflammatory fever. The latter cases, however, or those in which spirituous liquors, and especially alcoholic liquors, by which I mean those obtained by distillation, are habitually, and therefore excessively indulged in, are of a very complicated character, and generally very difficult to manage; for abstinence from the usual excitement, even if it could be insisted on, is not unfrequently productive of maladies almost as serious as those consequent upon its continuance; the mind, as well as the body, is almost always more or less affected, and the chronic diseases of the latter are not only numerous but peculiarly obstinate. The stomach, liver, kidneys, bladder, mucous membranes, and brain, one or all, may be the seat of various morbid actions, which are sustained by the slow poison; and if abstinence from the usual stimulant be enforced, there is a sinking of the energies of mind and body, and an indescribable restlessness, and sensation of lassitude and misery, which must be witnessed to be fully understood, and to avoid which, the unfortunate sufferer is induced not only to continue the habit which has brought it on, but to increase the quantity of the stimulant; hence it is that inveterate cases of habitual tippling are never cured; that those which are attacked in an earlier stage are very difficult of cure; and that poverty, and mental distress, which are so often the drunkard's excuse, though, perhaps, at first mitigated, come upon him afterwards with additional and irremoveable horrors. Among the lower orders, the great temptation to drink (I mean the habitual use of gin, and similar ardent spirits), is temporary excitement, and a lessened appetite for bread and meat, and such expensive necessaries of life; the higher and educated classes of society too often find an oblivious antidote in the same dangerous delusion: the result is as surely fatal in the one case as in the other, and as the habit, when once established, can scarcely, for the reasons I have stated, admit either of palliation or remedy, it becomes the duty of the moral and medical philosopher, to turn all his powers of advice and persuasion towards prevention, and to paint in strong colours the utter hopelessness of a cure.

In answer to these trite remarks, there are some who, admitting the evils of habitual drunkenness, advocate diurnal excess, in telling of statesmen, philosophers, and poets, who, in the enjoyment of health of mind and body, have attained a respectable old age, and have yet been what is called "two bottle men:" but such cases are rare exceptions to the rule, and, when carefully inquired into, are almost all fallacies. It is true that some herculean constitutions will resist all ordinary causes of wear and tear; but in general, persons in advanced life who indulge, with apparent impunity, in such excess, have passed through its earlier periods abstemiously and actively, and have only gradually habituated themselves to a more luxurious diet, as the advances of age have crept upon them, in the enjoyment of worldly prosperity and mental quiet: habits of inebriety are, in fact, rarely acquired late in life; and never, by persons who are fit for anything else. Old debauchees, when other sources of bodily gratification fail, will occasionally take to the bottle, and so demolish a constitution which had resisted the other inroads of disease. In these days, it is fortunately almost unnecessary to caution the young, among the educated classes of society, against the fatal consequences of inebriety; the drunkenness and profaneness of the olden time are now happily out of fashion, and though other and equally mischievous vices may possibly prevail, they are not such as find a place under the subject now before us.

ALE, *see* Beer.

ALEXIPHARMICS (from *αλεξειν, to repel*, and *φαρμακον, poison*). Articles of the Materia Medica, supposed to be antidotes to poisons.

ALEXITERICS (*αλεξειν, to repel*, and *τηρειν, to preserve*). Repellents of, and preservatives against, poison. The *aqua alexiterica* of the *London Pharmacopœia* for 1764, was a distilled water of mint, wormwood, and angelica.

ALGAROTH. *Algarotti's Powder.* An impure protoxide of antimony, obtained by decomposing sesquichloride of antimony by water. It is virulently emetic and cathartic, and not now used. It was first employed by Victor Algarotti, of Verona. It was also termed *mercurius vitæ.*

ALIMENT. *Alimentum* (from *alere*, to nourish). Food. That which is capable of supporting life, and of nourishing the body. Medical observations on the general qualities and relative nutritive powers of vegetable and animal food, and an enumeration of their varieties, constitute a branch of dietetic medicine sometimes included under the term *materia alimentaria.*

ALIZARINE (*Alizarine*, the Turkish name of madder). A crystallizable substance contained in the root of madder.

ALKALI, or ALCALI. *Arabic.* This term is generally limited to substances of a peculiar acrid taste, soluble in water, and capable of neutralising the acids, and converting many vegetable blue colours to green, yellows to brown, and certain reds (or blues which have been reddened by acid) to blue. It is usually limited to *potassa*, or the vegetable alkali; *soda*, or the mineral alkali; and *ammonia*, or the volatile alkali. These alkalis convert the oils into soaps, which are soluble in water; they also combine with carbonic acid to form soluble carbonates. There are some of the earthy bodies which are called *alkaline earths*, in consequence of their partaking more or less of the alkaline properties. Potassa and soda are called *fixed alkalis*, from resisting a red heat without evaporation; and they, as well as the alkaline earths, are *metallic oxides.* Ammonia is a compound of hydrogen and nitrogen.

ALKALIMETER (from *alkali*, and *μετρον, a measure*). A graduated glass tube for determining the quantity of acid of given strength which is saturated by the alkali under examination.—(See *Manual of Chemistry.*)

ALKALOID (from *alkali*, and *ειδος, like*). Certain proximate principles of vegetables, many of which are crystallizable, and in which the characteristic medical properties of the plant chiefly reside, have been termed *alkaloids*, because they neutralise acids, and act upon vegetable colours like alkalis, such as cinchonia, quinia, morphia, strychnia, &c.

ALKANET (*Alkana*, a reed, *Arabian*). The root of the *anchusa tinctoria*. It contains a red colouring matter, soluble in oils, and hence was formerly used for tinging salves and ointments. Lip-salve is often coloured red by this drug.

ALKOHOL, *see* ALCOHOL.

ALLIUM. *Garlic.* The bulb of the *Allium sativum*, or common garlic. *Cl.* 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Asphodeleæ.

The bulb is perennial; it is composed of several cloves enveloped in a common membrane; the scape rises about two feet; the leaves are long and grass-like, numerous at the foot and few upon the scape; the flowers arise between the small bulbs which terminate the scape, in a cluster, many of the flowers being small, whitish, and abortive; the spathe is common to all the florets and bulbs; it is roundish and withered; the perianth consists of six oblong divisions; the filaments are six, tapering, alternately trifid, shorter than the perianth, and furnished with oblong erect anthers; the ovary is placed above the insertion of the perianth, short, angular, and supports a simple style terminated by an acute stigma; the capsule is short, broad, trilobed, three-celled, and contains roundish seeds; it flowers in July.

Garlic is now principally used in cookery, and is well known as a heating condiment. Bergius prescribed it in agues, Sydenham in dropsy, and Lind in scurvy; and when boiled in milk, it has long been used as an anthelmintic. A gentleman who had suffered under a complication of what were termed nervous diseases, recovered after partaking largely of a soup overseasoned with garlic, which was followed by the evacuation of a long round worm, evidently the cause of his distressing symptoms. Garlic generally heats and stimulates, aggravating the temporary fever from which most persons suffer after partaking of highly-seasoned dishes. It soon impregnates the secretions with its odour. Externally it is sometimes applied to the soles of the feet, in the form of poultice, to cause what is called a *revulsion* from the head or breast, and is a common domestic application to indolent tumours and tardily-suppurating boils. A boiled clove of garlic is often put into the ear, to remedy those cases of deafness attended by deficient ceruminous secretion. The pulp or juice of garlic is an active rubefacient, but its acrimony is much diminished by continued boiling.

Dr. Paris observes, that garlic has a considerable analogy to squill and onion, and, like them, exerts a diuretic, diaphoretic, expectorant, and stimulant operation. Taylor's remedy for deafness is said to consist of oil of almonds impregnated by garlic and coloured by alkanet root. Garlic is also an ingredient in the different aromatic vinegars recommended by various foreign authors as antidotes to contagion. The most powerful antidotes to the flavour of this tribe of vegetables are said to be the leaves and seeds of the aromatic *umbelliferæ;* hence the odour of the breath, after partaking of onion or garlic, is counteracted by parsley; and if leek or garlic be mixed with a combination of aromatic ingredients, its virulence will be greatly mitigated and corrected.—(*Pharmacologia.*)

ALLSPICE, *see* PIMENTA.

ALMONDS, *see* AMYGDALA.

ALOE. *Aloës.* The inspissated juice of the *aloë spicata. Cl.* 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Asphodeleæ.

This plant is a native of Africa. The root is perennial, strong, fibrous; the stems rise three or four feet, and are smooth and erect, leafy towards the top: the leaves are numerous, narrow, tapering, thick or fleshy, succulent, smooth, glaucous, and beset at the edges with spiny teeth: the flowers are produced in terminal spikes, and of a reddish colour; the perianth is tubular, nectariferous, cut into six narrow lobes which separate at the mouth; the filaments are six, tapering, yellowish, inserted into the receptacle, and furnished with oblong orange-coloured anthers: the ovary is oblong, supporting a simple slender style, of the length of the filaments, and terminated by an obtuse stigma: the capsule is oblong, and divided into three cells, and contains many angular seeds.

The *aloë spicata* affords the finest varieties of the aloes of commerce, of which that imported from the Cape of Good Hope may be taken as a sample; but the aloes met with in trade is of very different qualities, and although the better kinds bear the name of *Socotrine aloes*, it is chiefly imported from Bombay, and not unfrequently remelted in this country, with a view of improving its tint and odour, and sometimes, it is said, of deteriorating its quality by the addition of common rosin, a fraud detected by the insolubility of such adulterated aloes in boiling water: it is probably the inspissated juice or extract of several varieties of aloe; at all events, different samples differ remarkably in appearance and character.

The finest aloes has a brilliant reddish-brown colour, and is translucent at the edges of the fragmented pieces: its fracture is smooth and conchoidal, its odour aromatic and rather agreeable, its powder deep gold colour, its taste intensely bitter and nauseous. But such is rarely found in trade: it is generally opaque, of a dull brown (*Hepatic aloes*), often passing into black (*Caballine aloes*), of a disagreeable odour, and very nauseous taste. It is, however, scarcely necessary to enter at length into a description of these varieties of aloes, since their medical virtues do not seem to be essentially different; and accordingly we may select for pharmaceutical use that which has the least unpleasant odour, and which, at the same time, seems to have suffered least from heat in its manufacture, and which is translucent, and gives a rich brown powder.

Aloes appears to be a mixture of gum, extractive, and a little resin; but whether its activity resides in one or all of these components has not been accurately ascertained. The relative proportion of the extractive to the resin has been variously stated, and of course differs in the different kinds: the bitter extract will be found to constitute 70 to 80 per cent. of the commonly occurring aloes, and the resin, or altered extract, 20 to

30 per cent. The action of nitric acid upon aloes is attended with some interesting chemical results, which have been examined by Braconnot (*Ann. de Chimie et Physique*, LXVIII. 24.), but they throw no light upon its medicinal uses. Aloes is nearly soluble in boiling water, but, as the solution cools, some resin and altered extractive are thrown down: the alkalies and their carbonates form with it permanent solutions, and proof-spirit dissolves and retains it with only a slight precipitation of resin.

The medical qualities of aloes give it a place of its own in the Materia Medica. It is a warm stimulating purgative; its action is chiefly upon the large intestines, of which it singularly promotes the evacuation, probably by increasing the muscular or peristaltic action rather than by augmenting their secretions, for it rarely produces liquid motions. It generally sits well upon the stomach, and its bitterness promotes appetite and digestion; when in the small intestines, it creates little alarm, and is seldom perceived till the sigmoid flexure of the colon feels its influence, the peristaltic movements of which are often perceptibly increased to the sensations of the patient, and then the rectum is quietly emptied.

Much has been said of the mischief done by aloes in irritating the rectum, and no doubt it is liable to create excitement there, but this is only where it is frequently used, and, in cases of habitual costiveness all purgatives are open to the same objection. Sedentary, studious, and idle persons, and more especially females in the higher classes of society, often resort to purgatives to obtain that regularity of intestinal evacuation which bodily exertion and due exercise only will ensure; and aloes, in consequence of its moderate, but at the same time certain operation, is among the usual remedies thus erroneously employed; whence a portion of the ill fame which it has acquired as especially productive of piles and uterine and rectal irritation.

In all cold indolent habits, where costiveness is attended by general sluggishness of the circulating system, with loss of appetite, irritability of temper, with disinclination both to mental and bodily exertion, and other symptoms of the milder hypochondriasis; where there is dyspepsia in females, blended with the disorders which arise from irregularity and inertness in the uterine system, aloes, in one or other of the forms I shall presently mention, is a valuable and safe remedy; and it is by far the most certain and secure substance for the relief of that temporary, but often obstinate and injurious costiveness, which usually follows the exhibition of opium.

But there are cases in which aloetics are hurtful, such, for instance, are plethoric and irritable habits, subject to hæmorrhoidal affections, or to excessive uterine evacuations.

The dose of aloes may vary from two to ten or fifteen grains; about five grains will usually evacuate the bowels in one or two bulky motions; but it is seldom that we give aloes alone: it is usually combined with stomachics, tonics, or other purgatives, or with nervine stimulants.

The following pills are useful for obviating costiveness in dyspeptic habits, but they should not be kept too long in a dry place, as they are apt to become hard, and so insoluble as to pass through the bowels, an inconvenience which may to a great extent be remedied by the addition to the mass of about a fourth part of sugar or of soap.

℞ Pulveris Aloës,
——— Mastiche,
——— Rhæi, āā ʒss.
Aquæ, q. s. ut fiant massa in pilulas xx. dividenda, quarum sumantur duæ vel tres ante prandium.

The time for taking these pills is immediately before dinner; they then blend with the food, prevent flatulency, and are usually found to be operative the following morning after breakfast.

There is a large quantity of aloes prepared in Barbadoes, and exported thence in large gourds, which contain upwards of half a hundred weight each.

It is deeper coloured and more opaque than the former; its consistence is tougher, its fracture less shining, and its odour strong and peculiar, especially when breathed upon; the colour of its powder is dirty yellow, and it is said to be more active than Socotrine aloes, and hence, though its price usually exceeds that of the other varieties, it is preferred in the preparation of horse medicines, a channel by which enormous quantities of aloes are consumed.

The aloetic preparations of the present *London Pharmacopœia* are the following:—

1. Decoctum Aloes compositum.
2. Enema Aloes.
3. Extractum Aloes.
4. Pilulæ Aloes compositæ.
5. Pilulæ Aloes cum Myrrhâ.
6. Pulvis Aloes compositus.
7. Tinctura Aloes.
8. Tinctura Aloes composita.
9. Vinum Aloes.

DECOCTUM ALOES COMPOSITUM.	COMPOUND DECOCTION OF ALOES.
℞ Extracti Glycyrrhizæ drachmas septem,	Take of Extract of Liquorice, seven drachms,
Potassæ Carbonatis drachmam,	Carbonate of Potassa, a drachm,
Aloes contritæ,	Aloes powdered,
Myrrhæ contritæ,	Myrrh, powdered,
Croci, singulorum drachmam cum semisse;	Saffron, of each a drachm and a half,
Tincturæ Cardamomi compositæ fluiduncias septem,	Compound Tincture of Cardamom, seven fluid ounces,
Aquæ destillatæ octarium cum semisse;	Distilled Water, a pint and a half;
Glycyrrhizam, potassæ carbonatem, aloen, myrrham et croci stigmata, decoque ex aquâ ad octarium, et cola; tum adjice tincturam cardamomi compositam.	Boil down the liquorice, carbonate of potassa, aloes, myrrh, and saffron, with the water, to one pint, and strain; then add the compound tincture of cardamom.

In this formula, the aloes is rendered permanently soluble by the alkaline carbonate; the liquorice covers its nauseous flavour, and the myrrh is tonic and stimulant; the tincture of cardamoms renders it grateful to the stomach, and preserves it from decomposition. The saffron, which might be omitted, is by some conceived to improve its flavour, but to most persons renders it more disagreeable.

In doses of half an ounce to an ounce, this is a mild warm aperient, and a useful form of aloes: it somewhat resembles the "Baume de Vie" of the French pharmaceutists, but is less purgative and bitter. In some hysterical, hypochondriacal, and spasmodic affections, and where the bowels have become torpid from the use of opiates, an ounce every morning, or every other morning, will generally produce one or two free motions. In dyspepsia it corrects acidity and flatulency, and often relieves palpitation, headach, sickness, and other symptoms of disordered digestion. It may be given with some aromatic water or infusion, and in some cases its aperient quality may be increased by the addition of infusion or tincture of senna.

ENEMA ALOES.	ENEMA OF ALOES.
℞ Aloes, scrupulos duos,	Take of Aloes, two scruples,
Potassæ Carbonatis, grana quindecim,	Carbonate of Potassa, fifteen grains,
Decocti Hordei, octarium dimidium.	Decoction of Barley, half a pint;
Misce et simul tere.	Mix and rub them together.

In mixing these ingredients, the aloes and carbonate of potassa should be well rubbed together, and the decoction of barley gradually added, so as to ensure solution. Aloetic enemata are sometimes useful in cases of amenorrhœa, attended by a loaded state of the lower bowels; they are also employed for the dislodgement of ascarides.

EXTRACTUM ALOES PURIFICATUM.	PURIFIED EXTRACT OF ALOES.
℞ Aloes contritæ, uncias quindecim,	Take of Aloes, powdered, fifteen ounces,
Aquæ ferventis, congium,	Boiling water, a gallon;
Macera per triduum leni calore, dein cola, et sepone ut fæces subsidant. Liquorem defæcatum effunde, et ad idoneam crassitudinem consume.	Macerate for three days by a gentle heat, then strain and set by, that the dregs may subside. Pour off the clear liquor, and evaporate to a proper consistence.

The dose of this extract is from five to fifteen grains, in the form of a pill; it is supposed to be a less stimulating purgative than the original aloes, but where aloetics are required, the original drug is preferable.

PILULÆ ALOES COMPOSITÆ.	COMPOUND PILLS OF ALOES.
℞ Aloes contritæ, unciam,	Take of Aloes, powdered, an ounce,
Extracti Gentianæ, unciam dimidiam,	Extract of Gentian, half an ounce,
Carui olei, minima quadraginta,	Oil of Caraway, forty minims,
Syrupi, quantum satis sit;	Syrup, as much as may be sufficient;
Simul contunde donec corpus unum sit.	Rub these together until incorporated.

The above and similar combinations of aloes with bitters and aromatics, are often resorted to in habitual costiveness, and some forms of dyspepsia: the above pill is apt to be too soft to retain its figure, otherwise it is a good medicine. From five to twenty grains is a dose: two pills of five grains each, taken two hours before dinner, generally evacuate the bowels once or twice in the evening or following morning.

PILULÆ ALOES CUM MYRRHA.	PILLS OF ALOES WITH MYRRH.
℞ Aloes, uncias duas,	Take of Aloes, two ounces,
Croci,	Saffron,
Myrrhæ, singulorum unciam,	Myrrh, each an ounce,
Syrupi, quantum satis sit;	Syrup, a sufficient quantity;
Aloen et myrrham separatim in pulverem tere; tum omnia simul contunde donec corpus unum sit.	Reduce the aloes and the myrrh separately to powder; then beat the whole together until incorporated.

These pills have long had a place in the different Pharmacopœiæ, under the name of *Pilulæ Rufi*. The saffron is useless, except, perhaps, as dividing the other ingredients; but the mixture of myrrh and aloes affords a good purge in chlorotic and leucophlegmatic habits. Two or three pills of five grains each may be taken twice or thrice daily, and the mass is frequently conjoined with the sulphate or some other preparation of iron. These, and many other pills, are apt to become hard and inactive by keeping, so that it is generally better, in regard to these formulæ, to keep the ingredients ready mixed in the form of powder, and to add the syrup at the time the pills are made.

PULVIS ALOES COMPOSITUS.	COMPOUND POWDER OF ALOES.
℞ Aloes, unciam cum semisse,	Take of Aloes, an ounce and a half,
Guaiaci Resinæ, unciam,	Guaiacum Resin, an ounce,
Pulveris Cinnamomi compositi, unciam dimidiam;	Compound powder of Cinnamon, half an ounce;
Aloen et guaiaci resinam separatim in pulverem tere; dein cum pulvere cinnamomi composito misce.	Rub the aloes and guaiacum resin separately into powder; then mix them with the compound powder of cinnamon.

This powder has been recommended as a warm diaphoretic purge, the dose being from ten to fifteen or even twenty grains; but it is an awkward and nauseous mode of administering aloes, and requires to be made into pills, for which the addition of syrup or mucilage is requisite.

TINCTURA ALOES.	TINCTURE OF ALOES.
℞ Aloes contritæ, unciam,	Take of Aloes, in powder, an ounce,
Extracti Glycyrrhizæ, uncias tres,	Extract of Liquorice, three ounces,
Aquæ destillatæ, octarium cum semisse,	Distilled Water, a pint and a half,
Spiritus rectificati, octarium dimidium;	Rectified Spirit, half a pint;
Macera per dies quatuordecim et cola.	Macerate for fourteen days, and strain.

In this tincture, as in the compound decoction, the nauseous bitterness of the aloes is covered by the extract of liquorice, and it is a good simple aloetic formula; the dose is from two to ten or twelve drachms, for the spirit which it contains is so diluted, as to admit of its administration in large doses. Where a liquid aloetic aperient is wanted, the above tincture may be prescribed, with the addition of an equal quantity of the compound infusion of senna.

TINCTURA ALOES COMPOSITA.	COMPOUND TINCTURE OF ALOES.
℞ Aloes contritæ, uncias quatuor,	Take of Aloes, powdered, four ounces,
Croci, uncias duas,	Saffron, two ounces,
Tincturæ Myrrhæ, octarios duos;	Tincture of Myrrh, two pints;
Macera per dies quatuordecim et cola.	Macerate for fourteen days, and strain.

This is the *Elixir Proprietatis* of the Pharmacopœia of 1720; it is an effective but nauseous form of aloes, and is unnecessarily encumbered by the large proportion of saffron. The old aloetic preparations corresponding with the above generally contained an acid; the prescription of Paracelsus contained sulphuric acid; that of Boerhaave, vinegar; and formerly acids and aloes were often prescribed in combination, but without any apparent advantage. In the dose of one or two drachms, the compound tincture of aloes is sometimes a convenient form of the drug; as an emmenagogue it may be conjoined with chalybeates, especially with the tincture of chloride of iron; or with valerian, as in the following formula:—

℞ Tincturæ Aloes compositæ,
Tincturæ Valerianæ, āā f℥j.
Tincturæ Ferri sesquichloridi, f℥ss.
Misce: sumatur cochleare unum minimum (seu fʒj.) bis quotidie, e cyatho infusi anthemidis.

Vinum Aloes.	Wine of Aloes.
℞ Aloes in pulverem tritæ, uncias duas,	Take of Aloes in powder, two ounces,
Canellæ contritæ, drachmas quatuor,	Canella in powder, four drachms,
Vini Xerici, octarios duos;	Sherry Wine, two pints;
Macera per dies quatuordecim, subinde movens, et cola.	Macerate for fourteen days, occasionally shaking, and strain.

As a decoction and two tinctures are already included in the officinal formulæ, the above wine is scarcely required; nor is the canella a good aromatic addition; cinnamon would have been preferable. The dose of this wine of aloes is from six to twelve drachms when used as a purgative; but one or two drachms are sometimes taken two or three times a day, to keep up a gentle stimulant action upon the lower bowels. The following formula for an aloetic wine is recommended by Dr. A. T. Thomson, in chlorotic dyspepsia, and in those affections of the mesenteric glands in children, which are accompanied by a tumid and tense abdomen; the dose is from one to four fluid drachms:—

℞ Sodæ carbonatis, ℥iij.
Ammoniæ sesquicarbonatis, ʒivss.
Myrrhæ contritæ,
Aloes contritæ, āā ʒvj.
Vini Xerici, f℥xxiv.
Macera per dies septem, et cola.

There are other pharmaceutical formulæ into which aloes enters, and which will be noticed under other heads, such as the compound extract of colocynth (*see* COLOCYNTH), the compound gamboge pills (*see* GAMBOGIA), and the compound rhubarb pills (*see* RHEUM).

ALTERATIVES. (*Altero, I change.*) Medicines by which the healthy functions of the body are slowly and gradually re-established, without the intervention of any sensible evacuation, either from the skin, stomach, or bowels. Small doses of the most powerful and active remedies occasionally operate as alteratives; hence mercurials and antimonials, and compounds of iodine and of bromine, are frequently administered in *alterative doses:* there are several mineral waters also which rank amongst the most effective alteratives. These medicines are generally administered daily for a considerable period, and some of them require to be given in large doses, especally certain *vegetable alteratives*, such as sarsaparilla.

ALTHÆÆ FOLIA ET RADIX. The leaves and root of the *Althæa officinalis*, *or Marshmallow* (from *αλθεω*, *I heal*, from its supposed healing qualities). *Cl.* 16. *Ord.* 8. Monadelphia Polyandria. *Nat. Ord.* Malvaceæ.

The marshmallow is a native of England, and grows in marshy places and near the shore; it flowers in July and August. The root is perennial, long, tough, white, and fibrous. The stems are annual, herbaceous, upright, and three or four feet high: the leaves are oval, lobed, and serrated, and covered with soft down: the stipulæ are two, narrow, and placed at the base of each leaf-stalk; the flowers consist of five petals, inversely heart-shaped, indented at the apex, and of a pale purple colour: the calyx is double, the exterior consisting of nine, and the interior of five, narrow-pointed segments: the stamina are numerous, united at the base and terminated by kidney-shaped anthers: the ovary is orbicular: the styles cylindrical, and furnished with bristly stigmas: the ripe carpels are kidney-shaped, numerous, placed in a circle, and one-seeded.

The roots are dug up for use in the autumn. 100 parts of the dried root contain, according to Meyer, mucilage with malic acid and several salts, 20: sweet extractive matter, 10·14: starch and inulin, 2: woody fibre, 66. Plisson has shown that the supposed principle called *althein* is asparagin, which this root yields in small quantity.

It is difficult to say why the leaves and root of marshmallow are still retained in the Pharmacopœia; their decoction is sometimes employed as a demulcent drink, but barley water, and other similar mucilaginous liquids, are preferable, and less liable to decomposition. The following is the only formula in which marsh-mallow is employed:—

SYRUPUS ALTHÆÆ.	SYRUP OF MARSHMALLOW.
℞ Althææ Radicis contusæ, uncias octo,	Take of Marshmallow Root, bruised, eight ounces,
Sacchari purificati, libras duas cum semisse,	Refined Sugar, two pounds and a half,
Aquæ, octarios quatuor;	Water, four pints;
Decoque aquam cum radice ad dimidiam, et liquorem frigefactum exprime. Sepone per horas viginti quatuor, ut fæces subsidant; tum liquorem effunde, atque adjecto saccharo, ad idoneam crassitudinem decoque.	Boil down the water with the root to one half, and press out the liquor when cold. Set it by for twenty-four hours, that the dregs may subside; then pour off the liquor, and, having added the sugar, boil down to a proper consistence.

This syrup soon ferments, and becomes ropy; and as it is scarcely ever prescribed, it is rarely found in the shops, and when found, is generally unfit for use.

ALUMEN, Alum. *Sulphas Aluminæ et Potassæ.* Sulphate of Alumina and Potassa. "It is entirely soluble in water: from the solution, ammonia or potassa, when added, throws down alumina, free from colour, which again dissolves when potassa is added in excess."

This salt is manufactured upon a large scale, for the uses chiefly of the calico printer and dyer. It forms very characteristic octoedral crystals, which are either perfect, or truncated either at the angles or edges, or both. It has a peculiar sweet, astringent, and slightly acid taste; it reddens vegetable blues, and is readily soluble in about its own weight of boiling water; as the solution cools, a great part of the salt separates in the crystalline form. When crystals of alum are heated, they fuse in their water of crystallization, and when this is driven off, the anhydrous salt is opaque, white, and spongy; in this state it forms the *Alumen exsiccatum*, or *dried alum*, of the Pharmacopœia. At a red heat, alum gradually suffers a partial decomposition, losing a little of its acid, and consequently becoming imperfectly soluble in water.

Alum, in the crystallized form, consists of

	Atoms.	Equivalents.	Per Cent.
Sulphate of Alumina	3	174	35·73
Sulphate of Potassa	1	88	18·07
Water	25	225	46·20
Crystallized Alum	1	487	100·00

Alum is a powerful astringent, but it is chiefly employed externally. It is sometimes prescribed in doses of from five to fifteen grains, conjoined with aromatics, but it is apt to gripe and nauseate. It has been administered in agues, internal hæmorrhages, and gleets; in the latter, *alum-whey* has sometimes proved useful; it is prepared as follows:—

℞ Lactis Vaccini bullientis, oct. j.
Aluminis contriti, ʒij.
Ebulliant simul ut fiat coagulum, coletur serum, et sumatur cyathus subinde.

Alum may also be given in pills:—

℞ Aluminis contriti,
Pulv. Cinnam. compos. āā ʒss.
Confectionis Rosæ Gallicæ q. s. ut fiat massa in pilulas xviij. dividenda; ij. vel iij. pro dosi.

Externally applied, aluminous solutions are useful in chronic ophthalmia and in gleets, and alum forms a good addition to gargles in relaxed uvula.

In these cases it may be prescribed as follows:—

℞ Aluminis, gr. vj. Solve in
Aquæ Rosæ, f℥v. ut fiat collyrium.

℞ Aluminis, ℈j.
Aquæ Rosæ, f℥v.
Tinctur. Cardam. compos. fʒij.
Mellis Rosæ, fʒvj.
M. fiat gargarisma sæpe utendum.

A saturated solution of alum is recommended by Dr. Scudamore as a remarkably efficacious styptic. One ounce of water holds about thirty grains of alum in permanent solution.

What is termed *alum-curd* is sometimes used as an astringent and cooling external application. It is made by beating up the white of an egg with a piece of alum till it forms a coagulum.

ALUMEN EXSICCATUM.	DRIED ALUM.
Alumen in vase fictili ad ignem liquescat; tum augeatur ignis donec ebullitio cessaverit.	Let alum liquefy in an earthen vessel on the fire, then let the fire be increased till the ebullition has ceased.

In this process, the greater part of the water of crystallization of the alum is expelled, so that it loses nearly half its weight, and becomes a white porous mass; but care must be taken, not so far to increase the heat as to decompose the remaining salt.

Alum, by drying, is rendered more active, as an external application, and in this state it forms an ingredient in some styptic powders.

LIQUOR ALUMINIS COMPOSITUS.	COMPOUND SOLUTION OF ALUM.
℞ Aluminis,	Take of Alum,
Zinci Sulphatis, singulorum unciam,	Sulphate of Zinc, of each one ounce,
Aquæ ferventis, octarios tres;	Boiling water, three pints;
Alumen et zinci sulphatim in aqua simul liqua; dein cola.	Dissolve the alum and the sulphate of zinc together in the water; then filter.

This is the *aqua aluminosa Bateana* of the Pharmacopœia of 1745. It is a powerfully astringent solution. It furnishes a good collyrium in some cases of ophthalmia, diluted with rose or elder-flower water; but it must be recollected that mischief frequently results from the injudicious use of corrugating eye-washes. A small proportion of mucilage of gum arabic is often a good addition to astringent injections; it retains them longer upon the parts: upon this principle the following may be used for the cure of gleet:—

℞ Liquoris Aluminis compositi, fʒvj.
Aquæ destillatæ, f℥vjss.
Misturæ Acaciæ, f℥ss. M.

The following collyrium may be employed in ophthalmia, after local bleeding has been properly resorted to:—

℞ Liq. Alum. compos. f℥ss.
Aquæ Rosæ, f℥vss. Misce.

The above, and other aluminous solutions, are often used as detergent applications to old ulcers, and they are sometimes very effective in relieving chilblains. Salts of zinc and of iron may be correctly combined with aluminous solutions, but when any soluble salt of lead is added to them, an insoluble sulphate of lead is immediately formed. Thus, if solutions containing equivalents of acetate of lead and of alum are mixed, sulphate of lead is precipitated, and acetate of alumina remains dissolved. No considerable portion of alcohol can be added to a solution of alum, without either immediately precipitating a portion of the salt, or causing it shortly to deposit a crystalline sediment; hence the impropriety of mixing spirituous preparations with aluminous lotions.

ALUMINUM. *Aluminium*, or *Alumium*. This is the metallic base of *alumina:* it is obtained by decomposing chloride of aluminum by potassium. It is of a gray colour, has little lustre, is hard, difficult of fusion, and is not oxidized by air or water at common temperatures; but when heated nearly to redness, it burns vividly, and becomes converted into oxide of aluminum, or *alumina;* it is also slightly oxidized by boiling water.

Alumina is composed of

	Atoms.	Equivalents.	Per Cent.
Aluminum	1	10	55·5
Oxygen	1	8	44·5
Oxide of Aluminum	1	18	100·0

Pure alumina is obtained by decomposing a solution of pure alum by potassa, thoroughly edulcorating the precipitate by boiling distilled water, redissolving it in pure muriatic acid, precipitating it by ammonia, and washing as before.

Alumina, when well dried, is an insipid powder, strongly attractive and retentive of moisture; it has a powerful affinity for many varieties of vegetable extract and colouring matters, and also for ligneous fibre; and upon these properties its various applications in the arts of dyeing and calico-printing chiefly depend. It is the only earth or oxide which forms a plastic mass with water; hence it is an essential ingredient in porcelain and pottery, and forms a part of the various clays used in those manufactures. It importantly influences the soils in which it is contained, and when not in excess, contributes to their fertility. It is not used in medicine.

AMALGAM (from *αμα*, *together*, and *γαμεω*, *to marry*). A term applied to the combination of mercury with the other metals.

AMBER. *Succinum*. A fossil resin, chiefly brought from the southern coast of the Baltic, where it is thrown up on the beach; it is also found in the beds of brown coal and bituminous wood. It is of various shades of yellow, more or less transparent, and a little heavier than water; it appears to contain two distinct resins, bitumen, volatile oil, and succinic acid. When heated, it fuses, burns, and exhales an agreeable aromatic odour. It has a place in the Materia Medica, as a source of a peculiar volatile or empyreumatic oil; the *acid of amber* is no longer retained in our Pharmacopœia.

Oleum Succini.	Oil of Amber.
In alembicum immitte succinum, ut destillent balneo arenæ, calore paulatim aucto, liquor acidus, oleum, et sal oleo inquinatus. Dein iterum et tertio, oleum destillet.	Put the amber into an alembic, that there may distil from it, in sand bath, by a heat gradually increased, an acid liquor, an oil, and a salt soiled by the oil. Then let the oil be distilled again, and a third time.

Rectified oil of amber has a pungent acrid taste, and a peculiar but not unpleasant odour; it is insoluble in water, and sparingly soluble in alcohol. In doses of from five to fifteen minims, this oil was once esteemed as an antispasmodic stimulant, and prescribed in hysterical and convulsive affections, either in pills, or diffused by the aid of mucilage or of yolk of egg, in aromatic waters. It is now scarcely ever used, except externally; and as it appears to possess no efficacy beyond that of a stimulant, its high price and strong odour are against its employment. The following liniment, rubbed upon the chest two or three times a day, has been recommended in whooping-cough:—

℞ Tincturæ Camphoræ,
Tincturæ Opii,
Olei Succini, āā f℥ss.
Fiat linimentum.

A celebrated empirical remedy for this disease, known under the name of *Roche's Embrocation*, is said to be composed as follows:—

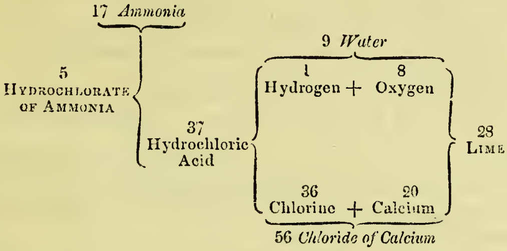
℞ Olei Succini,
Olei Caryophillorum, āā f℥ss.
Olei Olivæ, f℥j.
Misce.

AMBERGRIS (French, *Ambergris*, Gray Amber). A substance found floating on the sea, and probably a concretion from the intestines of the spermaceti whale. It contains a considerable portion of fatty matter, and some specimens afford benzoic acid. Its odour, especially when dissolved in alcohol, is peculiar, and to most persons agreeable, and is very diffusible, so that it is often added in minute quantities to lavender water, and other perfumed articles. In medicine it is apparently ineffective.

AMMONIA. *Volatile Alkali. Sal ammoniac*, the substance from which pure ammonia is chiefly obtained, was originally procured by burning the dung of camels, which was collected for the purpose near the temple of Jupiter Ammon, in Egypt, whence the term, *Sal ammoniac*, and *ammonia*.

Ammonia, in its pure or gaseous state, was first obtained by Priestley; its composition was afterwards determined by the two Berthollets, and ultimately accurately settled by Gay-Lussac.

To procure ammonia, two parts of dry quicklime and one of sal ammoniac (hydrochlorate of ammonia) are to be separately powdered, then mixed, and introduced into a small retort; upon the application of a moderate heat, *ammonia* is evolved in the form of a gas, extremely soluble in water, so that when it is required pure, and in its gaseous state, it must be collected in the mercurio-pneumatic apparatus. The theory of this process is as follows:—hydrochlorate of ammonia is a compound of ammonia and hydrochloric acid; lime consists of calcium and oxygen; the lime and the hydrochloric acid mutually decompose each other, producing water and chloride of calcium, the ammonia being at the same time evolved. The details of this decomposition are shown in the following diagram, the annexed numbers representing the equivalent weights of the acting bodies and of the products.



Hence it appears that 54 parts (by weight) of hydrochlorate of ammonia, composed of 17 of ammonia and 37 of hydrochloric acid, require for decomposition, 28 of lime, composed of 20 of calcium and 8 of oxygen; the oxygen of the lime combines with the hydrogen of the acid, to produce water; and the calcium with the chlorine, to produce chloride of calcium, the elements of the hydrochloric acid being 1 of hydrogen and 36 of chlorine. Independent of the details, therefore, it appears that 54 parts of hydrochlorate of ammonia and 28 of lime, are requisite for the evolution of 17 parts of ammonia*.

The specific gravity of ammonia, as compared with air, is as 590 to 1000, or, compared with hydrogen, as 8500 to 1000; so that it is much lighter than air, and much heavier than hydrogen; 100 cubical inches weigh between 18 and 19 grains; it is pungent and acrid, and, therefore, unrespirable; but when largely diluted with air, it is an agreeable nasal stimulant; it has a powerful alkaline action on vegetable colours, but the change of tint is only temporary, and disappears as the ammonia, in consequence of its volatility, escapes. It retains its gaseous state at all common pressures and temperatures; but when subjected to a pressure of six and a half atmospheres, it is condensed, at the temperature of 50°, into the liquid form. It is greedily absorbed by water, which, at the temperature of 50°, is capable of taking up between six and seven hundred times its volume of gaseous ammonia; the specific gravity of this saturated solution is ·875, that of water being 1000 (*see* LIQUOR AMMONIÆ).

When ammonia is passed through a red-hot tube, or subjected to a long succession of electric sparks, its volume is doubled, and it is decomposed into a mixture of hydrogen and nitrogen gases, which, therefore, are its elements: in this case, two volumes of ammonia are resolved into a mixture of one volume of nitrogen and three volumes of hydrogen; and as the combining weight or equivalent of ammonia is 17, its composition may be stated as follows:—

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* In this and similar tables used in this volume, the original substances are printed in small capitals, their component parts in common type, and the final products in italics.

	Atoms.	Equivalents.	Per Cent.	Volumes.
Nitrogen	1	14	81·13	1
Hydrogen	3	3	18·87	3
Ammonia	1	17	100·000	2

The preparations of ammonia which have a place in the last edition of the *London Pharmacopœia* are the following:—

AMMONIÆ HYDROCHLORAS. *Hydrochlorate of Ammonia.*
LIQUOR AMMONIÆ. *Solution of Ammonia.*
AMMONIÆ SESQUICARBONAS. *Sesquicarbonate of Ammonia.*
LIQUOR AMMONIÆ SESQUICARBONATIS. *Solution of Sesquicarbonate of Ammonia.*
LIQUOR AMMONIÆ ACETATIS. *Solution of Acetate of Ammonia.*
LINIMENTUM AMMONIÆ. *Liniment of Ammonia.*
LINIMENTUM AMMONIÆ SESQUICARBONATIS. *Liniment of Sesquicarbonate of Ammonia.*
SPIRITUS AMMONIÆ. *Spirit of Ammonia.*
SPIRITUS AMMONIÆ AROMATICUS. *Aromatic Spirit of Ammonia.*
SPIRITUS AMMONIÆ FŒTIDUS. *Fœtid Spirit of Ammonia.*
TINCTURA AMMONIÆ COMPOSITA. *Compound Tincture of Ammonia.*

AMMONIÆ HYDROCHLORAS. *Hydrochlorate of Ammonia.* No directions are given in the Pharmacopœia for the preparation of this salt; it is therefore placed in the list of the Materia Medica, as an article of manufacture. There are two leading sources of the ammonia required for the production of this salt; the one is the destructive distillation of animal substances, such as refuse bone, horn, hoof, skin, &c., which, when subjected to heat, are decomposed, and their elementary nitrogen and hydrogen, at the moment of their evolution, combine so as to form ammonia, which, therefore, is one of the multifarious products of the process. The other, is the destructive distillation of pit-coal so largely carried on for the supply of coal-gas; nitrogen and hydrogen are among the elements of such coal, and one of the leading condensible products of the gas-manufacture is termed *ammoniacal liquor;* it contains ammonia, and many other complicated substances. The crude and highly impure ammonia contained in either of these liquors, is converted, by the addition of sulphuric acid, into *sulphate of ammonia*, which, after having been purified by crystallization, is decomposed by the action of chloride of sodium (common salt), at a high temperature; the products are, *hydrochlorate of ammonia*, which rises in vapour, or sublimes, and is condensed in proper vessels, in the form of a saline cake: and *sulphate of soda*, which, not being volatile, remains.

The following tables show the composition of the several salts just mentioned, and, in conjunction with the succeeding diagram, will explain the formation of hydrochlorate of ammonia, and the relative weights of the different products and educts.

Sulphate of ammonia is a hydrated salt, consisting, in its dryest state, of

	Atoms.	Equivalents.	Per Cent.
Ammonia	1	17	25·7
Sulphuric Acid	1	40	60·5
Water	1	9	13·8
Sulphate of Ammonia	1	66	100·0

Chloride of sodium consists of

	Atoms.	Equivalents.	Per Cent.
Sodium	1	24	40
Chlorine	1	36	60
Chloride of Sodium	1	60	100

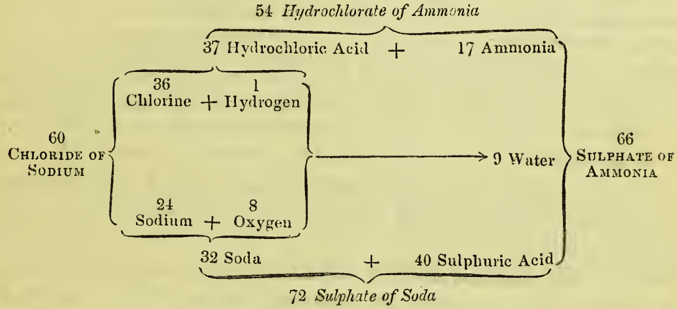
Hydrochlorate of ammonia is anhydrous, and is composed of

	Atoms.	Equivalents.	Per Cent.
Ammonia	1	17	31·5
Hydrochloric Acid	1	37	68·5
Hydrochlorate of Ammonia	1	54	100·0

Sulphate of soda (anhydrous) contains

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	44·5
Sulphuric Acid	1	40	55·5
Sulphate of Soda	1	72	100·0

The following diagram shows that 66 parts of sulphate of ammonia, and 60 of common salt, are requisite for the production of 54 of hydrochlorate of ammonia, and 72 of sulphate of soda:—



Hydrochlorate of ammonia usually occurs in the form of broken cakes, of a radiated texture, and often presenting differently tinted laminæ, arising from the varying purity of successive portions of the sublimed salt; it is frequently tinged by iron; it is soluble in about 3·25 parts of water at 60°, and much cold is produced during the solution; it is soluble in its weight of boiling water, and the solution yields small cubic, octoedral, and plumose crystals; it is sparingly soluble in pure alcohol, but more abundantly in common rectified spirit, or in diluted alcohol. Its taste is sharp and urinous; its specific gravity is 1·450. It sublimes without decomposition when heated.

Like other ammoniacal salts, it is decomposed by the fixed alkalis, and the alkaline earths; these salts, therefore, are recognised by the evolved odour of ammonia, when they are triturated with a little quicklime, or caustic potassa.

The principal pharmaceutical use of sal ammoniac is as a source of pure and carbonated ammonia; its perfect purity, therefore, is not very essential. When contaminated by iron, it is more or less tinged of a brown colour: it is said sometimes to afford traces of hydrobromate of ammonia, which may be detected by the brown discoloration occasioned by adding solution of chlorine. Dissolved in lotions, it furnishes a good stimulating discutient; and if previously mixed with about its weight of powdered nitre, and dissolved in six or eight parts of cold water, it produces a very cold lotion, which may sometimes be employed as a substitute for ice. It is rarely used internally, though it acts as a refrigerant and diuretic, in doses of from five to twenty grains dissolved in water. In all cases of its employment, the fixed alkalis and alkaline earths, as also solutions of lead and silver, are incompatible with it. The only notice of this salt in our Pharmacopœia is the following:—

Nota.	Note.
Ammoniæ Hydrochloras (*crystallina*). Translucens, calore sublimis fertur, et in aquâ penitùs liquatur. Lacmum colore rubro levitèr afficit. Nihil ex barii chlorido demittit. Adjectâ potassâ aut calce, ammonia ejicitur.	Hydrochlorate of Ammonia (*crystalline.*) Translucent, is sublimed by heat, and entirely dissolved by water. It slightly reddens litmus. It affords no precipitate with chloride of barium. Ammonia is evolved by the addition of potassa or lime.
Liquor Ammoniæ.	Solution of Ammonia.
℞ Ammoniæ Hydrochloratis, uncias decem, Calcis, uncias octo, Aquæ, octarios duos; Calcem aquâ resolutam in retortam mitte, dein ammoniæ hydrochloratem in frustula contritam et reliquam aquam adjice. Destillent liquoris ammoniæ fluidunciæ quindecim.	Take of Hydrochlorate of Ammonia, ten ounces, Lime, eight ounces, Water, two pints; Put the lime, slaked with water, into a retort, then add the hydrochlorate of ammonia, rubbed into fragments, and the rest of the water. Let fifteen ounces of solution of ammonia distil.

The theory of this decomposition is given above (page 41), only as water is here present, the ammonia is dissolved in it, instead of being evolved in the state of gas.

The list of the Materia Medica includes another and stronger solution of ammonia, under the name of *ammoniæ liquor fortior;* so that the above formula seems unnecessary, as the weaker may always be obtained by diluting the stronger. The following are the *notes* relating to these solutions:—

Nota.	Note.
Ammoniæ Liquor. Calore in vapores alkalinos fugaces, teste curcumâ, penitùs abit. Adjecto liquore calcis, nihil dejicit, neque ubi acido nitrico saturatus fuerit, quicquid demittit per ammoniæ sesquicarbonatem, aut perargenti nitratem. Hujus liquoris pondus specificum est 0·960.	*Solution of Ammonia.* By heat it entirely disappears in fugacious alkaline vapours, as indicated by turmeric. On the addition of lime-water, nothing is precipitated; nor, after it is saturated by nitric acid, is anything thrown down by sesquicarbonate of ammonia, or by nitrate of silver. The specific gravity of this solution is 0·960.
Ammoniæ Liquor Fortior. Hujus pondus specificum est ·882. Liquor hic ad normam liquoris ammoniæ redigi potest, cuique fluidunciæ adjectis fluidunciis tribus aquæ destillatæ. Cætera superiori respondent.	*Stronger Solution of Ammonia.* The specific gravity of this is ·882. This solution may be reduced to the strength of the (preceding) solution of ammonia, by adding to each fluid ounce, three fluid ounces of distilled water. In other respects it resembles the above.

When these solutions are heated, the whole of the ammonia is driven off, and on evaporation to dryness, there is no residue. If they contain carbonic acid, lime-water renders them turbid; and the presence of hydrochloric acid, or a chloride, would cause a precipitate on saturation by pure nitric acid and the addition of nitrate of silver.

The preceding *liquor ammoniæ* contains about 10 *per cent.* of ammonia, and the *liquor ammoniæ fortior* contains about 30 *per cent.*; for the proportion of ammonia in these aqueous solutions is inversely as their densities, as shown in the following table:—

100 parts, of Sp. Gr.		Of Ammonia.	100 parts, of Sp. Gr.		Of Ammonia.
·8750	contain	32·50	·9435	contain	14·53
·8875		29·25	·9476		13·46
·9000		26·00	·9513		12·40
·9054		25·37	·9545		11·56
·9166		22·07	·9573		10·82
·9255		19·54	·9597		10·17
·9326		17·52	·9619		9·60
·9385		15·88	·9692		9·50

In medicine, the above *liquor ammoniæ* is employed as a powerful stimulant and antacid; it may be given in doses of from fifteen minims to half a drachm or a drachm, in various degress of dilution. It is an effective nervous stimulant in certain paralytic affections, and in those cases of indistinct vision and noise in the ears to which nervous persons are subject, and which sometimes appear connected with debilitated digestive powers. Faintness and giddiness are also frequently immediately relieved by a due dose of ammonia; and in heartburn and acidity in the stomach and *primæ viæ*, it is useful, not merely as a stimulant, but as neutralizing the irritating acid matter. In such cases it may be conveniently given with small doses of bitters, and occasionally with a little magnesia, as in the following formula: in all these cases, however, preparations of carbonate of ammonia are usually substituted for the pure alkali:—

℞ Liquoris Ammoniæ,
Tinctur. Cardam. compos.
Tinctur. Gentianæ compos. āā f ʒss.
Mistur. Camphoræ, f ℥iss.
M. fiat haustus.

In the latter stages of typhus, in which tremors and subsultus tendinum occur, moderate doses of ammonia, in conjunction with aromatic confection, and analogous cordials, are sometimes prescribed: but it must be recollected, that although a powerful, it is a transient stimulus. A large dose of ammonia, diluted with such a quantity of water as may enable it to be swallowed without much inconvenience, often operates as an emetic, especially if followed by a draught of warm water; but, although it has been recommended in this way, in some cases of asthma and pulmonary obstruction, it is not to be relied on.

In pyrosis or water-brash, ammonia with small doses of opium is of service, and in a variety of spasmodic disorders, similar combinations, with ether, may be resorted to; they also prove diaphoretic.

As a *nasal stimulant*, liquid ammonia is used for the relief of headach, faintness, and vertigo. A piece of rag moistened with it, and applied to the region of the stomach, in cases of spasmodic pains of that viscus; to the throat externally, in the varieties of inflammatory sore throat; or to the joints in rheumatic affections, is a remedy often useful: but in such cases, combinations of ammonia with oily substances are usually to be preferred.

It has been proposed to inhale ammonia, duly diluted with atmospheric air, in the latter stages of pneumonia, and in cases where the bronchial tubes are loaded with mucus which cannot be expectorated; but, if so employed, the utmost caution must be observed in regard to the quantity administered, and the mode of administration; for ammonia is an acrid or irritant poison, and there are several cases on record where it has acted as such, having been inadvertently administered in over-doses, or strong liquid ammonia incautiously applied to the respiratory organs.

Ammonia is sometimes spoken of as an antidote to certain poisons, and more especially where persons have been bitten by venomous snakes. *Eau de luce* (the *tinctura ammoniæ composita* of the present Pharmacopœia), which is strong liquid ammonia, flavoured by oil of amber, and of lavender, and rendered milky by mastic, is among the remedies most esteemed in these cases, in many parts of India; but we have no satisfactory evidence of its real efficacy, either as relates to its external or internal use. In very mild cases, so powerful a stimulant may possibly be of service; the sting of the scorpion, and the bite of the viper, are said to have been thus successfully treated, but in these cases, the symptoms are so various in different individuals, and so seldom fatal, that no specific virtue can be assigned to ammonia upon such evidence.

As an external stimulant, ammonia is almost exclusively applied in the form of Liniment, which see.

Ammoniæ Sesquicarbonas.	Sesquicarbonate of Ammonia.
℞ Ammoniæ Hydrochloratis, libram,	Take of Hydrochlorate of Ammonia, one pound,
Cretæ, libram cum semisse;	Chalk, a pound and a half;
Separatim in pulverem tere; tum misce et calore paulatim aucto sublima.	Rub them separately to powder, then mix, and sublime by a heat gradually raised.

Liquor Ammoniæ Sesquicarbonatis.	Solution of Sesquicarbonate of Ammonia.
℞ Ammoniæ Sesquicarbonatis, uncias quatuor,	Take of Sesquicarbonate of Ammonia, four ounces,
Aquæ destillatæ, octarium;	Distilled Water, a pint;
Liqua ammoniæ sesquicarbonatem in aquâ, et cola.	Dissolve the sesquicarbonate of ammonia in the water, and filter.

Nota.	Note.
Ammoniæ Sesquicarbonas (*crystallina*). Translucet, aëre autem in pulverem fatiscit; calore tota dissipatur. In aquâ penitus liquatur; curcumæ colorem mutat. Acido nitrico usque ad saturatio-	*Sesquicarbonate of Ammonia* (*crystalline*). It is translucent, but falls to powder in the air; it is entirely dissipated by heat. It is completely dissolved by water; it changes the colour of tur-

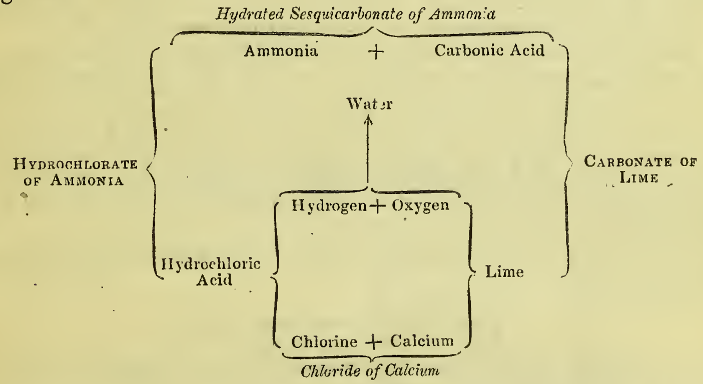
nem adjecto, nihil, vel a barii chlorido, vel ab argenti nitrate, demittitur.

meric. When saturated by the addition of nitric acid, nothing is precipitated from it, either by chloride of barium or by nitrate of silver.

The above is the *ammoniæ subcarbonas* of the former Pharmacopœia. It is largely prepared by the wholesale manufacturer, and should have had a place in the list of the Materia Medica. It is obtained by sublimation, from a mixture of *sulphate of ammonia* and carbonate of lime, or from hydrochlorate of ammonia and carbonate of lime, as directed. In the former case, sulphate of lime and hydrated carbonate of ammonia, and in the latter, chloride of calcium and the hydrated carbonate, are the results; and, as the salt so obtained contains an atom of ammonia in combination with an atom and a half of carbonic acid, the term *sesquicarbonate of ammonia* is applied to it, consistently with modern nomenclature. Mr. R. Phillips states its composition as follows:—

	Atoms.	Equivalents.	Per Cent.
Ammonia	1	17	28·81
Carbonic Acid	1½	33	55·93
Water	1	9	15·26
Sesquicarbonate of Ammonia	1	59	100·00

The theory of the decomposition is illustrated by the following diagram:—



"It is to be remarked," says Mr. Phillips (translation of *London Pharmacopœia*), "that both the hydrochlorate of ammonia and carbonate of lime are neutral compounds; that is, each consists of 1 equivalent of acid and 1 of base; the production of sesquicarbonate of ammonia, which is a supersalt, instead of a neutral one, as usually happens when neutral compounds suffer mutual decomposition, is explained by supposing 3 equivalents of each salt to undergo decomposition, when, if no loss occurred in the operation, the carbonate of ammonia would be neutral and hydrated, consisting of

Three equivalents of Carbonic Acid . . .	22 × 3 = 66
Three equivalents of Ammonia . . .	17 × 3 = 51
Three equivalents of Water . . .	9 × 3 = 27
	144

"During sublimation, however, one of the equivalents of the ammonia liberated, and one of the water formed, are dissipated, whilst the quantity of carbonic acid remaining undiminished, the carbonate actually sublimed consists of 3 equivalents of carbonic acid, and only 2 of ammonia, which, as just shown, constitute it a sesquicarbonate."

This hydrated *sesquicarbonate of ammonia* generally occurs in hardish translucent cakes; it has a pungent odour, a sharp urinous taste, and acts upon vegetable colours in the manner of an alkali. It should be kept in well-stoppered bottles, for when exposed to air, it gradually loses ammonia, becomes opaque, pulverulent, and less pungent, and ultimately passes into a *hydrated bicarbonate of ammonia*, composed of

	Atoms.	Equivalents.	Per Cent.
Ammonia	1	17	21·5
Carbonic Acid	2	44	55·7
Water	2	18	22·8
Hydrated Bicarbonate of Ammonia	1	79	100·0

Sesquicarbonate of ammonia is soluble in about four times its weight of cold water; the solution (liquor ammoniæ sesquicarbonatis) loses ammonia by exposure to air, and it is therefore better to prepare it when required. The tests of chloride of barium and nitrate of silver (directed in the above quoted *note* of the Pharmacopœia), applied to this solution, after saturation by *pure* nitric acid, are intended to show, by their non-effect, the absence of sulphuric and hydrochloric acids.

Sesquicarbonate of ammonia is an antacid, and nervous stimulant, useful in the same cases as the *liquor ammoniæ.* It is generally given in solution, and often with aromatics, as in the *spiritus ammoniæ compositus*, but its solid form renders it a proper ingredient in pills; and when mixed with extracts, it does not readily escape by evaporation. It may be given in doses of from two to ten or twelve grains; in larger doses, it is apt to nauseate.

The following may be adopted, where it is required in the form of pill:—

℞ Ammoniæ Sesquicarbonatis pulver.
Extracti Gentianæ, āā ℨss.
Fiat massa in pilulas xij. dividenda, quarum sumatur una bis vel ter die.

Saturated by citric acid, ammonia is sometimes employed in preference to citrate of potassa, and is thought to be more diaphoretic; as in the following "Haustus ammoniæ citratis:"—

℞ Ammoniæ Sesquicarbonatis, ℈j.
Succi Citri recentis, fℨvj.
(Vel Acidi Citrici Cryst. gr. xxiv.)
Aquæ Destillatæ, fℨvij.
Syrupi Tolutani,
Spiritus Myristicæ, āā fℨss. M.

Coarsely bruised, and scented with a little oil of lavender, cloves, or bergamot, sesquicarbonate of ammonia forms common *smelling salt*, and is a nasal stimulant in faintness and hysteria, and serves as an occasional substitute for snuff, where persons are desirous of breaking themselves of its habitual use. A little calcined magnesia, or a few drops of the strong solution of ammonia, renders the smelling-bottle more pungent; and in some cases, coarsely-powdered glass, moistened with strong and scented solution of ammonia, is a good substitute for the salt. Reduced to fine powder, and mixed with lard, or spermaceti ointment, it is sometimes usefully applied as a rubefacient; it may also be employed as an adjunct to anodyne plasters, for rheumatic and muscular pains. One part of the powdered salt, mixed with three of extract of belladonna, and applied in the form of a plaster, is effectual in allaying some rheumatic and spasmodic pains.

We occasionally hear of carbonate of ammonia acting as a poison. Huxham has related a case of a young man who had acquired the strange habit of chewing this salt. (*Essay on Fevers*, p. 308, as quoted by Dr. Christison.) He was seized with hæmorrhage from the nose, gums, and intestines; his teeth dropped out; wasting and hectic fever ensued; and although he was at length prevailed on to abandon his pernicious habit, he died of extreme exhaustion, after lingering several months.

LIQUOR AMMONIÆ ACETATIS.	SOLUTION OF ACETATE OF AMMONIA.
℞ Ammoniæ Sesquicarbonatis, uncias quatuor cum semisse, vel quantum satis sit, Aceti Destillati, octarios quatuor; Aceto ammoniæ sesquicarbonatem usque at saturationem adjice.	Take of Sesquicarbonate of Ammonia, four ounces and a half, or as much as may be sufficient, Distilled Vinegar, four pints; Add the sesquicarbonate of ammonia to the vinegar till it is saturated.
NOTA.	NOTE.
Ammoniæ Acetatis Liquor. Adjecto acido hydrosulphurico non coloratur, nec quicquid demittit adjectâ vel argenti nitrate, vel barii chlorido. Liquore consumpto, quod restat ammoniam ejicit, et in igne perit.	*Solution of Acetate of Ammonia.* By the addition of hydrosulphuric acid it is not coloured, nor is anything thrown down by the addition either of nitrate of silver, or of chloride of barium. The solution being evaporated, what remains evolves ammonia, and is dissipated by the fire.

The above tests are intended to show the absence of lead or copper, which would occasion a black or brown colour upon the addition of sulphuretted hydrogen; and of hydrochloric and sulphuric acids, which would be indicated by a white precipitate with nitrate of silver and chloride of barium. Acetate of ammonia is decomposed and destroyed by heat, so that there should be no residue on evaporating its solution to dryness, and exposing the remaining salt to a red heat.

As neither the strength of distilled vinegar, nor the composition of the sesquicarbonate of ammonia of commerce, are very definite, somewhat more or less than the above mentioned weight may be required; accordingly, the exact point of saturation can only be ascertained by the careful use of litmus and turmeric paper; and, in consequence of the presence of carbonic acid retained by the solution, it should be left rather acid than alkaline.

When pure acetic acid is saturated by ammonia, and carefully evaporated, prismatic crystals of the acetate are obtained, which, when heated to about 250°, lose ammonia, and yield a crystalline sublimate of bicarbonate of ammonia. The neutral salt probably consists of

	Atoms.	Equivalents.	Per Cent.
Ammonia	1	17	25
Acetic Acid	1	51	75
Acetate of Ammonia	1	68	100

Liquor ammoniæ acetatis is sometimes prepared by saturating strong acetic acid with solution of ammonia, and duly diluting the solution. It is generally slightly turbid, or has a yellowish tint, which may be removed by filtering it through a little well-burned charcoal. It is the *spirit of Mindererus* of old pharmacy, and has long been employed as a diaphoretic febrifuge; though in itself not very active, it is usefully conjoined with other diaphoretics. The dose, in such cases, is from half an ounce to an ounce, in conjunction with syrup of poppies, spirit of sulphuric ether, compound powder of ipecacuanha, antimonials, &c. The following is a good night draught for allaying the restlessness and irritation that often attends a common catarrh:—

℞ Liq. Ammoniæ Acetatis,
Mistur. Camphoræ, āā f ʒvj.
Syrup. Papaveris, f ʒj.
Vini Antimon. Potassio-Tartratis, ♏xx.
M. ft. haustus hor. s. s.

Like many other diaphoretics, if its operation be not aided by external warmth, it is apt to act by the kidneys, and, in some cases, it proves considerably diuretic.

Liquor ammoniæ acetatis is also used externally, as a discutient and stimulant; it is an excellent application in common cases of mumps; it should be applied hot upon a flannel. As a collyrium in opacity of the cornea, Boerhaave long ago recommended it, diluted with its bulk of water and dropped into the eye. In chronic ophthalmia the following is a useful application:—

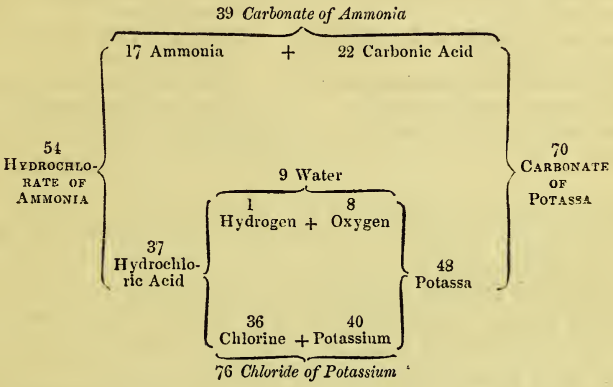
℞ Liq. Ammon. Acet. f ℥ss.
Aquæ Rosæ, f ℥iijss.
Tinctur. Opii, f ʒj.
M. ft. collyr.

Dr. A. T. Thomson recommends it as a lotion in porrigo affecting the scalp.

SPIRITUS AMMONIÆ.	SPIRIT OF AMMONIA.
℞ Ammoniæ Hydrochloratis, uncias decem,	Take of Hydrochlorate of Ammonia, ten ounces,
Potassæ Carbonatis, uncias sedecim,	Carbonate of Potassa, sixteen ounces
Spiritûs rectificati,	Rectified Spirit,
Aquæ, singulorum octarios tres;	Water, of each, three pints;
Misce, et destillent octarii tres.	Mix, and let three pints distil.

In this formula, the hydrochlorate of ammonia is decomposed by carbonate of potassa, so as to produce carbonate of ammonia and chloride of potassium; and the former salt, being volatile, passes over in distillation along with the alcohol, while the residuary water holds the chloride in solution.

The following diagram exhibits the mutual decomposition of the salts, and the annexed equivalent numbers show their required weights, and those of the products:—



Spirit of ammonia is a transparent colourless fluid, of a pungent smell and acrid taste; its specific gravity is 0·860; it is principally employed in the preparation of other ammoniated formulæ, and occasionally as a stimulating liniment, either alone, or mixed with the *linimentum saponis compositum.* For internal use, the aromatic, or compound spirit of ammonia, is generally preferred.

Spiritus Ammoniæ Aromaticus.	Aromatic Spirit of Ammonia.
℞ Ammoniæ Hydrochloratis, uncias quinque,	Take of Hydrochlorate of Ammonia, five ounces,
Potassæ Carbonatis, uncias octo,	Carbonate of Potassa, eight ounces,
Cinnamomi contusi,	Cinnamon bruised,
Caryophylli contusi, singulorum drachmas duas,	Cloves bruised, of each two drachms,
Limonum Corticis, uncias quatuor,	Lemon-peel, four ounces,
Spiritûs rectificati,	Rectified Spirit,
Aquæ, singulorum octarios quatuor;	Water, of each four pints;
Misce, et destillent octarii sex.	Mix, and let six pints distil.

This is the *spirit of salvolatile*, or *compound spirit of ammonia*, of former Pharmacopœiæ; it is not so strong as the preceding simple spirit of ammonia, and is rendered more agreeable in taste and odour by the presence of the aromatics. Its specific gravity is 0·914; it becomes brown by keeping. It is employed in the dose of from twenty to sixty minims in an ounce or an ounce and a half of any proper vehicle, such as water or camphor mixture. It is very commonly prescribed with æthereal preparations; and being compatible with sulphate of magnesia, is usefully added to aperient draughts containing that salt, as a preventive of spasm and flatulency.

In acid dyspepsia, accompanied by languor and irritability, the following is a useful formula:—

℞ Magnes. Carbon. ℈j.
Mistur. Camphor. f℥iss.
Spt. Ammon. Arom. fʒss.
Tinct. Opii, ♏v.
M. fiat haustus horâ decubitûs sumendus.

Spiritus Ammoniæ Fœtidus.	Fœtid Spirit of Ammonia.
℞. Ammoniæ Hydrochloratis, uncias decem,	Take of Hydrochlorate of Ammonia, ten ounces,
Potassæ Carbonatis, uncias sedecim,	Carbonate of Potassa, sixteen ounces,
Spiritûs rectificati,	Rectified Spirit,
Aquæ, singulorum octarios tres,	Water, of each three pints,
Assafœtidæ, uncias quinque ;	Assafœtida, five ounces ;
Misce ; tum lento igne destillent octarii tres.	Mix ; then, with a slow fire, let three pints distil.

By this process, a solution of the volatile odorous principle of assafœtida is obtained; but this preparation is rarely resorted to, and might, without inconvenience, have been omitted, since a combination of spirit of ammonia and tincture of assafœtida, extemporaneously made, may be substituted for it. Its specific gravity is 0·861. When prescribed, it is in nervous and hysterical cases, in the dose of from half a drachm to a drachm. It is stimulant and antispasmodic.

For the remaining preparations of ammonia, see LINIMENTS.

AMMONIACUM. The gum resin of the *Dorema ammoniacum*. *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This plant is a native of Persia; it is perennial, and grows without cultivation on the plains of the province of Irak, about forty miles south of Ispahan. The genus *Dorema* (from *δορημα*, *a gift or benefit*) is distinguished from Ferula and Opoponax, to both of which it is strongly allied, by a large cup-shaped epigynous disk, completely sessile flowers, and solitary resiniferous canals. The Persians call the plant *oshak*. It is so abundant in resinous juice, that it oozes upon the slightest puncture. When it has attained perfection, innumerable beetles, armed with an anterior and posterior probe of half an inch in length, pierce it in all directions; the exuded juice soon becomes dry, and is then picked off, and sent by Bushire to India, whence it is imported into Europe (Don: *Transactions of the Linnæan Society*, 1832.)

Ammoniacum is found in two forms in the London drug market: either in separate drops, or tears; or in agglutinated masses. That which is decidedly guttiform, of a clean buff-colour externally, paler within, and free from impurities, is most esteemed. Ammoniacum has little smell, but its taste is bitter, nauseous, and somewhat pungent. In warm weather, it is of a tough and unmanageable consistence, but in low temperatures it becomes brittle, and it may be powdered and sifted in frosty weather, which is a better mode of freeing it from mixed impurities than straining it when softened by boiling water. The powdered ammoniacum should be packed up in small oblong parcels, as it will afterwards again agglutinate. The chemical characters of ammoniacum are those of a gum resin; it is imperfectly soluble in water and in alcohol; but triturated with the former, the soluble gummy portion suspends the resin, and the mixture is tolerably permanent. According to Bucholz, it contains

Volatile Oil	4·0
Resin	72·0
Gum	22·4
Bassorin	1·6
	100·0

Ammoniacum is placed by systematic writers on the Materia Medica among the stimulating expectorants; antispasmodic virtues are also ascribed to it; but, independent of other aid, little reliance can be placed in the use of ammoniacum as fulfilling such character, and it is chiefly used in combination with, or as a vehicle for, more powerful and certain medicines, as in the *pilulæ ipecacuanhæ compositæ*, and *pilulæ scillæ compositæ* of the Pharmacopœia. In the coughs, however, of aged persons, unattended by inflammatory action, and characterised by the secretion of viscid mucus in the bronchiæ, with difficult expectoration, and some degree of spasmodic action, ten grains of ammoniacum, three times a day, seem to have proved of service in allaying spasm and facilitating the evacuation of the mucous matter. The *mistura ammoniaci* of the Pharmacopœia may also be used, in doses of from half an ounce to an ounce, in cases of this kind; and in females, where it is desired to increase the activity of the uterine system, as well as to fulfil the other abovementioned indications, the following may sometimes be usefully administered.

℞ Mistur. Ammoniaci,
Aq. Menth. Pulegii, āā fʒvj.
Spirit. Ammon. Arom.,
Syrup. Scillæ, āā fʒss.
M. fiat haustus bis die sumendus.

According to Dr. Thomson, in that peculiar state of the bowels often accompanying hypochondriasis and dyspepsia, in which there is an almost constant degree of cholic, particularly after taking food, and which appears to arise from a viscid mucus lodged in the intestines, a combination of ammoniacum and rhubarb is singularly efficacious.

MISTURA AMMONIACI.	MIXTURE OF AMMONIACUM.
℞ Ammoniaci, drachmas quinque, Aquæ, octarium;	Take of Ammoniacum, five drachms, Water, a pint;
Tere ammoniacum cum aqua paulatim instillata, donec intime misceantur.	Rub the ammoniacum with the water, gradually added to it, till they are perfectly mixed.

This is a useful form for the exhibition of ammoniacum. Clean tears of the gum-resin should be selected for its preparation, and the mixture should appear uniformly milky. To these suspensions of the resinous matter of the gum-resins in water, the term *lac*, or *milk*, was formerly applied, and under that term they are still frequently designated in pharmacy; but they are better adapted for extemporaneous prescription, than pharmacopœia formulæ, for the resinous portion subsides, and cannot, after a time, be blended with the gummy solution.

Mixture of ammoniacum is used as a slightly stimulating expectorant, and is often of much service in dry hoarse coughs, unattended by decided inflammatory action or a quick pulse, and in the cases which have been alluded to above. From six drachms to an ounce is the usual dose, and its most elegant accompaniment is almond emulsion; it is thus a favourite vehicle for small doses of squills, or of ipecacuanha, as in the following prescriptions, applicable to the cases mentioned:—

℞ Misturæ Ammoniaci,
Misturæ Amygdalæ, āā f ʒvj.
Tincturæ Scillæ, ♏x.
Misce pro haustu ter die sumendo.

℞ Misturæ Ammoniaci, f ℥j.
Misturæ Camphoræ, f ℥ss.
Pulveris Ipecacuanhæ, gr. j.
Tincturæ Camphoræ compos. f ʒj.
Fiat haustus bis die sumendus.

Solution of acetate of ammonia may often be properly substituted for the camphor mixture in these formulæ, and such combinations are in some instances actively diuretic and sudorific. Ammoniacum in conjunction with nitric acid is said to be a good expectorant, where large accumulations of purulent or mucous secretion exist, with difficult or feeble expectoration; to this end, ten or fifteen minims of dilute nitric acid may be given in one ounce of the ammoniacum mixture.

EMPLASTRUM AMMONIACI.	PLASTER OF AMMONIACUM.
℞ Ammoniaci, uncias quinque,	Take of Ammoniacum, five ounces,
Aceti destillati, fluiduncias octo;	Distilled Vinegar, eight fluid ounces;
Liqua ammoniacum in aceto; dein liquorem, lento igne, assiduè movens ad idoneam crassitudinem consume.	Dissolve the ammoniacum in the vinegar; then evaporate the liquor over a slow fire, constantly stirring it, to a proper consistence.

This is a good adhesive, and slightly stimulating plaster, and generally agrees well with irritable skins. It is most effective when recently prepared; hence the advantage of using a mixture of ammoniacum and vinegar beaten together at the time it is wanted, and applied immediately to the part affected. There is a peculiar disease of the knee, to which servant-maids, who scour floors upon their knees, are liable, and for which, according to Dr. Paris, the ammoniacum plaster is a specific.

AMYGDALA. The seed of the *Amygdalus communis*. *Cl.* 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Amygdaleæ.

The term *amygdala*, *αμυγδαλη*, is said to be derived from *αμυσσω*, *to lancinate*, because, after the green fruit is removed from the kernel, its shell appears fissured or lacerated. Two varieties of the almond are directed for medical use, viz. *α. Amygdala amara*, bitter almond; *β. Amygdala dulcis*, sweet almond. The list of the Materia Medica also includes

Amygdalæ Oleum ; Oleum ab alterutriusque nucleis expressum.
Oil of Almond; the expressed Oil of either of the kernels.

The almond-tree is a native of Syria and Barbary, but thrives well in all the warmer parts of Europe: in this country its fruit seldom ripens, but it forms an elegant ornament to our shrubberies, bearing its beautiful pink blossoms early in the spring, and before the leaves appear. It attains the height of fifteen or twenty feet, and is covered with gray bark: the leaves, which are about three inches long and three-fourths of an inch broad, are pointed at both ends, minutely serrated, and stand upon a short footstalk: they are bright green: the pale pink flowers are supported on short peduncles: the calyx is tubular, with the limb divided into five blunt segments: the petals are five, oval and convex: the filaments about thirty, inserted into the calyx, tapering, spreading, of unequal lengths, and furnished with orange-coloured anthers; the ovary is downy, with a simple style, supporting a round stigma: the fruit, which is of the peach kind, but flatter, with a tough coriaceous covering, opens longitudinally when ripe: the kernel is enclosed in a spongy shell; it is oblong, flattened, pointed at one end and round at the other, and composed of two white cotyledons, covered with a brown furrowed skin.

The two varieties of almond are remarkably distinguished by the flavour of the kernel, being in the one, bland, sweetish, and inodorous; and in the other, of a bitter flavour, and, when rubbed with a little water, smelling of hydrocyanic acid.

Amygdala dulcis. Sweet Almond.—Three varieties of the sweet almond occur in commerce: 1. *Jordan almonds*, which are the finest, come from Malaga; of these there are two kinds; the one, above an inch in length, flat, and with a clear brown cuticle, sweet, mucilaginous, and rather tough; the other more plump and pointed at one end, brittle, but equally sweet with the former. 2. *Valentia almonds* are about three-eighths of an inch broad, not quite an inch long, round at one end, and obtusely pointed at the other, flat, of a dingy brown colour, and dusty cuticle. 3. *Barbary* and *Italian almonds* resemble the latter, but are generally smaller, and less flattened. Rancid, worm-eaten, and broken almonds, should be rejected. By steeping for a few minutes in boiling water, or some hours in cold water, the kernel may be squeezed out of the cuticle, or *blanched.* According to Boullay, 100 parts of sweet almonds yield—

Fixed Oil	54·0
Albumen	24·0
Sugar	6·0
Gum	3·0
Water	3·5
Cuticle	5·0
Fibrin	4·0
Loss, (and a trace of Acetic Acid) .	0·5
	100·0

The preparations of sweet almonds directed in the *London Pharmacopœia* are, the confection, mixture, and expressed oil; the latter being, however, indiscriminately procured from sweet and bitter almonds.

Confectio Amygdalæ.	Confection of Almonds.
℞ Amygdalæ dulcis, uncias octo, Acaciæ contritæ, unciam, Sacchari, uncias quatuor;	Take of Sweet Almonds, eight ounces, Acacia, powdered, one ounce, Sugar, four ounces;
Amygdalis priùs in aquâ frigidâ maceratis, demptisque pelliculis, omnia simùl contunde, donec corpus unum sit.	Having first macerated the almonds in cold water, and removed their skins, pound all together till incorporated.
Confectio hæc diutius incorrupta servari potest si amygdalæ, acacia, et saccharum separatim trita, demum misceantur. Tum quotiès confectione utendum est, omnia simul contunde, donec corpus unum sit.	This confection may be longer kept unaltered, if the almond, acacia, and sugar, separately rubbed, are afterwards mixed. Then, whenever the confection is to be used, pound all together till incorporated.

When the almonds, sugar, and gum arabic, in the proportions above directed, are well beaten together into an uniform mass, *without water*, (which is not ordered, and should not be added,) the resulting mixture is not more apt to spoil, or become rancid, than when the ingredients are separately powdered and subsequently mixed; but if, in order to soften the mass, a little water be added, it then soon becomes mouldy, or rancid, or both. This confection has, in fact, nothing but its convenience to recommend it, and when good almond emulsion is wanted, the almonds should be blanched, and beaten up with the water and sugar at the time.

Mistura Amygdalæ.	Mixture of Almonds.
℞ Confectionis Amygdalæ, uncias duas cum semisse, Aquæ destillatæ, octarium;	Take of Confection of Almonds, two ounces and a half, Distilled Water, a pint;
Confectioni amygdalæ aquam paulatim inter terendum adjice, donec misceantur; dein per linteum cola.	Gradually add the water to the confection of almonds, rubbing them till they are mixed; then strain through linen.

Milk of almonds, or almond emulsion, is an agreeable diluting drink in inflammatory febrile affections, and it is often directed in preference to other demulcents and diluents, in inflammatory affections of the urinary passages. It is a common vehicle for refrigerants in fevers, and for expectorants in affections of the lungs, though liable to the objection of spontaneous decomposition, for it soon separates into a kind of curd and whey, and afterwards becomes sour, especially in the warm rooms of invalids. Where these inconveniences can be guarded against, it usefully enables us to alter the form and character of a medicine, by substituting it for water, or other comparatively inert vehicles; a consideration not unfrequently of importance, especially where a plan of treatment requires to be pursued for a long time. It is an excellent medium for the exhibition of the alkalies and alkaline carbonates, in cases of urinary gravel, and they in some measure prevent its tendency to decomposition. Nitre, and small doses of the neutro-saline aperients, tincture of squills, and powder or wine of ipecacuanha, are also properly prescribed in this mixture. When ordered for infants, its tendency to acescency should especially be borne in mind, as it has in that way given rise to troublesome diarrhœa. The following formulæ are added for the sake of illustration:—

In uric diathesis—

℞ Sodæ Bicarbonatis, ʒss.
Misturæ Amygdalæ, f℥jss.
Tinctur. Cardam. compos. fʒss.
Fiat haustus bis vel ter die sumendus.

Proper doses of carbonate of soda, and of carbonate and bicarbonate of potassa, may occasionally be substituted for the bicarbonate of soda in this draught; carbonate of magnesia, and, in some cases, sesquicarbonate of ammonia, may also be given in the same vehicle.

As a diaphoretic in inflammatory disorders:—

℞ Potassæ Nitratis, ʒss.
Liquoris Ammoniæ Acetatis, f℥jss.
Vini Antimonii Potassio-tartratis, fʒiij.
Misturæ Amygdalæ, f℥vj.
Fiat mistura, cujus sit dosis cochlearia tria magna quartâ quâque horâ.

As a vehicle for expectorants in catarrh—

℞ Potassæ Carbonatis, ℈j.
Succi Limonum recentis, f℥ss.
Misturæ Amygdalæ, fʒx.
Vini Ipecacuanhæ, ♏xxv.
Misce pro haustu, mane, meridie, et vesperi sumendo.

℞ Liquoris Ammon. Acet. f℥jss.
Misturæ Amygdalæ, f℥vss.
Syrup Tolutani,
Tinct. Scillæ, āā fʒij.
M. fiat mistura : cochlear. iij. ampla pro dosi.

Sometimes a few bitter almonds are employed in emulsion, on account of their agreeable flavour; and emulsion of bitter almonds has been used as a form of prussic acid, but their uncertain action as a sedative, renders them, in this form, objectionable.

The *expressed oil of almonds* is chiefly obtained from bitter almonds, in consequence of the value of the residuary cake, as a source of essential or distilled oil. It should be clear, and free from rancidity; tasteless, inodorous, and of a pale yellow colour. Its specific gravity at 60° is about ·910. When cooled down to 15°, it deposits about 24 *per cent.* of *margarin;* the remaining *elain* does not congeal at 0°. It is readily soluble in pure ether, and in 25 parts of cold and 6 of boiling pure alcohol.

In large doses, almond oil is slightly aperient, but it is not employed with that view, except occasionally to clear the bowels of infants; a tea-spoonful of a mixture of equal parts of syrup of roses and almond oil, well shaken together, will sometimes answer the purpose.

As a demulcent, oil of almonds is used in the form of emulsion, or of soap; in the former case, the following formula may be adopted:—

℞ Acaciæ Pulveris, ℥ss.
Aquæ Destillat, f℥ss. adde gradatîm,
Olei Amygdalæ, fʒiij. tere simul et adde,
Aquæ Destill. f℥iij.
Aquæ Rosæ, f℥jss.
Syrupi, fʒiij. Misce fiat emulsio.

Two or three tablespoonsful of this, or some similar mixture, may be taken to allay the irritation of the trachea and larynx in catarrh and cough; or it may be made the vehicle of expectorants and sedatives; cinnamon water, or mint water, may occasionally be substituted for the rose water in the above.

The following will be also found useful in allaying the tickling and irritating cough consequent upon catarrh:—

℞ Confectionis Rosæ Caninæ, ℥ij.
Syrupi Papaveris, f℥ss. tere simul et adde gradatim,
Olei Amygdalæ, f℥ss.
Misce optimè ut fiat linctus cujus sumatur cochleare unum minimum subinde.

With the alkalis, almond oil yields a soapy mixture, which may be substituted for emulsion, or which sometimes, with an increased quantity of alkali, is used in renal and urinary irritation, especially that arising from uric sand.

℞ Olei Amygdalæ, f℥ss.
Aquæ Rosæ, f℥ij.
Liquoris Potassæ, fʒji. Misceantur agitatione, et adde,
Syrupi, f℥ss.
Aquæ Destillatæ, f℥v.
M. fiat mistura, de qua sumantur, f℥ij. pro dosi.

In cases of catarrh, with hoarseness, fʒiss. of *liquor ammoniæ* is sometimes substituted in the above mixture for the solution of potassa.

Amygdala amara. Bitter Almond.—The source of the peculiar flavour of the bitter almond may be obtained by distillation with water; it then appears as a volatile oil, generally heavier than water, having the concentrated odour of the bitter almond, and partaking of some of the properties of the hydrocyanic acid. It is this ingredient which renders bitter almonds intensely poisonous to some animals, and not unfrequently they produce deleterious effects upon the human system.

This oil has been the subject of a curious and interesting inquiry by Robiquet and Boutron-Charlard (*Ann. de Chimie et Physique*, XLIV. 352), and by Wöhler and Liebig (*Ann. de Chimie et Physique*, LI. 273). It appears, from their researches, to be a mixture of hydrocyanic acid and a peculiar volatile oil, neither of which pre-exist in the original almond, but are produced during the distillation, by the joint action of heat and water, upon a distinct principle contained in the almond. This principle has been termed *amygdalin* (*Ann. de Chimie et Physique*, LXIV. 185). By agitating the essential oil of the bitter almond with a solution of potassa and protochloride of iron, the hydrocyanic acid may be separated from the volatile oil just mentioned, and by redistilling the latter over quicklime, it is deprived of adhering water, and obtained pure. It is then clear and colourless, and retains the peculiar odour of the moist bitter almond; when exposed to the joint action of oxygen and light, it is converted into benzoic acid. This oil appears to be a *hydruret* of a base composed of carbon, hydrogen, and oxygen, which base has been called *benzule* (*see* BENZOIN).

As an article of the Materia Medica, the distilled oil of bitter almonds is sedative, and ranks with the narcotic poisons. The symptoms attendant upon it are, trembling, weakness, palsy, convulsions, often of the tetanic kind, and finally coma: but frequently it occasions vomiting, and the animal in that way may escape (see Christison, Orfila, Granville, &c.)

Sir Benjamin Brodie, in the course of his experiments upon this oil, happened to touch his tongue with a probe which had been dipped into it; I was present at the time, and thought he would have fallen, so instantaneous was the effect; it produced an indescribable sensation at the pit of the stomach, feebleness of limbs, and loss of power over the muscles; but these effects were transient, and even momentary. The following case of poisoning by this oil, recorded by Mertzdorff, is quoted by Dr. Christison (*On Poisons*, Art. *Hydrocyanic Acid*). A hypochòndriacal gentleman, 48 years old, swallowed two drachms of the essential oil. A few minutes afterwards, his servant, whom he sent for, found him lying in bed, with his features spasmodically contracted, his eyes fixed, staring, and turned upwards, and his chest heaving convulsively and hurriedly. A physician, who entered the room twenty minutes after the draught had been taken, found him quite insensible, the pupils immovable, the breathing stertorous and slow, the pulse feeble and only 30 in a minute, and the breath exhaling strongly the odour of bitter almonds. Death ensued ten minutes afterwards. Dr. Christison also mentions a fatal case which occurred in London, where the individual, intending to compound a nostrum for worms with beech-nut oil, got, by mistake, from the druggist, *peach-nut* oil, which is nothing else than oil of bitter almonds.

From Sir B. Brodie's experiments to ascertain the mode in which death is immediately produced by this and analogous poisons, it would appear that they operate upon the nervous system; that through the medium of the nerves, the influence of the poison is conveyed to the brain, the functions of which are more or less impaired; that the organs of respiration are thus secondarily affected, but that the action of the heart continues for a long time unimpaired, circulating venous blood; hence, if respiration be artificially performed, so as to aërate the blood, it sometimes happens that the animal permanently recovers.

Essential oil of bitter almonds is largely prepared for the use of perfumers, confectioners, and cooks, who generally use what is called the *essence of almonds*, or a solution of ʒij. of the oil in ʒvj. of alcohol; this is also the most convenient form for its pharmaceutical employment. One hundred weight of the bitter almond cake remaining in the press after the separation of the fixed oil, is put into the still with about 400 gallons of water, this large proportion being necessary to prevent the formation of a mucilaginous magma, from which the volatile oil will not pass off, and which often, if brought to boil, rises up into the head and worm of the still. The produce of oil is liable to much variation, 1 cwt. of cake yielding from 1 ounce to 2¾ by weight. It often deposits a considerable portion of white crystallized matter, which is benzoic acid.

The cases in which it has been proposed to administer the essential oil of bitter almonds, are those in which the diluted hydrocyanic acid has been recommended. Affections of the lungs, preceded or connected with phthisis; coughs of a spasmodic character, and especially whooping cough; an irritable state of the nervous system; asthmatic complaints, and some cases of local irritation, are the principal diseases in which it has been found useful; and it may be administered with camphor and other antispasmodics; but its uncertain and varying strength render it highly objectionable (*see* HYDROCYANIC ACID).

AMYLUM (from *a*, *priv.*, and *μυλον*, *a mill*, because formerly made without the aid of a mill). *Starch.* Triticum Hibernum. *Winter Wheat. Cl.* 3. *Ord.* 2. Triandria Monogynia. *Nat. Ord.* Gramineæ. Seminum fæcula. *The fæcula of the seeds.*

This important grain was first cultivated in Sicily. When wheat, swollen and softened by steeping in water, is subjected to pressure, the milky juice which exudes, being diffused through water, deposits a fine impalpable powder, which, when duly washed and carefully dried, splits into columnar masses, known as common starch. It has usually a yellowish hue, which is covered in the starch of commerce by the addition of smalt; or, as in Hall's patent process, is removed by the action of chlorine. For medical use, however, the pure and genuine starch should be used, its colour being unimportant. Starch is marked by well-defined chemical characters. It is insoluble in cold water, but readily dissolves in water at 160°, and at 180° it forms a thick jelly, which in warm weather soon liquefies, and becomes mouldy, sour, and fetid. The diluted jelly of starch is copiously precipitated by subacetate of lead, and when solution of iodine is added to it, a very characteristic blue compound is immediately formed.

Starch, which has been heated till it acquires a pale brown colour, loses its peculiarities, and is converted into a substance soluble in cold water, not precipitable by iodine, and having the leading chemical characters of gum. When long boiled in water, acidulated by sulphuric acid, starch is converted into sugar. The ultimate composition of starch closely resembles that of gum and sugar, and may be represented as follows:—

	Atoms.	Equivalents.	Per Cent.			
Carbon	7	42	43·75	=	Carbon	43·75
Hydrogen	6	6	6·25		Water	56·25
Oxygen	6	48	50·00			
Starch	1	96	100·00			100·00

Starch is very nutritious, and exists in the greater number of esculent grains and roots. A warm solution of starch is often employed as a vehicle for opium and other sedatives, when administered in the form of enema. For this purpose, the following *decoctum amyli* is directed in the Pharmacopœia. It is the former *mucilago amyli.*

DECOCTUM AMYLI.	DECOCTION OF STARCH.
℞ Amyli, drachmas quatuor,	Take of Starch, four drachms,
Aquæ, octarium;	Water, a pint;
Amylum cum aquâ paulatim instillatâ tere, dein paulisper coque.	Gradually add the water to the starch, and rub them together; then boil them for a short time.

Wheat starch, in its usual form, can scarcely be regarded as an article of food; it is chiefly prepared for stiffening various fabrics, and articles of wearing apparel; and is used in the manufacture of lozenges, and other kinds of hard confectionary. But there are some varieties of this vegetable principle which are of common and important use in the diet of invalids; these are, *Sago*, which is the granulated fæcula obtained from the pith of certain palms of the genus *Sagus ; Tapioca*, which is obtained from an American plant, the *Jatropha manihot*, the milky juice of which is poisonous, but when diffused through water, it deposits a harmless starch; and *Arrow-root*, which is the fæcula of the *Maranta arundinacea.*

The last is in most general use, and affords a viscid solution in warm water, which concretes into a gelatinous form on cooling. It is best prepared for use by putting a dessert spoonful into a pint basin, and thoroughly mixing it with about two ounces, or half a teacupful of cold water; this is kept constantly stirred whilst boiling water is gradually added so as nearly to fill the basin, and in this way an even solution is obtained, more or less viscid according to the quantity of water added; if the boiling water be at once poured upon the arrow-root, or if it be put into hot water, it forms a lumpy, intractable, and disagreeable mixture. Thus prepared, it is an excellent vehicle, when duly sweetened, for wine, brandy, aromatics, and other cordials; or, in opposite cases, for lemon and orange juice, tartar, small doses of nitre, and similar refrigerants.

ANETHUM (from *ανευ, afar*, and *θεω, I run*, because its roots extend far). Dill. *Fructus;* the fruit (seed) of the *Anethum graveolens. Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This plant is a native of Spain and Portugal. Its root is fusiform, long, sending off strong fibres; several stems generally rise from one root, and are erect, smooth, channelled, branched, and about two feet high; the leaves stand upon sheathing footstalks, placed at the joints of the stalk, and are alternate, smooth, doubly pinnated, with the pinnæ linear and pointed; the flowers are produced in terminal umbels, which are large, flat, and, like the partial umbels, composed of several radii; it has no involucrum; the corolla consists of five petals, which are yellow, egg-shaped, obtuse, concave, and their points turned inwards; the five filaments are yellow, longer than the corolla, and furnished with roundish anthers; the ovary is placed below the insertion of the petals, and is covered by the disk; the two styles are very short, and terminated by obtuse stigmata; the seeds are two, oval, flat, striated, and surrounded with a membranous margin. The flowers appear in June and July.

The seeds have an aromatic warmth, somewhat like that of caraways. They should be chosen of a fresh and bright colour, heavy, and having their peculiar aromatic odour when handled. Those which are dull, dusty, light, inodorous, or mouldy, should be rejected. They are occasionally given in powder, as a carminative, to infants. They derive their aromatic warmth from essential oil, which they yield in the proportion of about two pounds from each hundred-weight. Distilled with water, they afford the *aqua anethi*, or dill-water, of the Pharmacopœia, which is a good substitute for the powder.

Aqua Anethi.	Dill Water.
℞ Anethi contusi, libram cum semisse,	Take of Dill, bruised, a pound and a half,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos.	Water, two gallons;
Destillet congius.	Let one gallon distil.

The small quantity of alcohol which is here added to the dill water, is supposed to prevent any subsequent change in it, and does not in any way interfere with its usual medicinal employment. The odour and flavour of this water improve on keeping, provided it has been distilled from clean and healthy seeds. The essential oil of dill is not in the present Pharmacopœia.

Dill water is a good remedy for flatulency, and its consequent hiccup, in young children, to whom a dessert spoonful may be occasionally given. It also is a useful vehicle for magnesia, or prepared chalk, in cases of acidity at the stomach; and for small doses of the saline aperients.

ANGUSTURA BARK, *see* Cusparia.

ANIME. A resin obtained from the *Hymenæa Courbaril*, formerly employed in certain plasters, but now out of use.

ANISUM. Anise. *Fructus;* the fruit (seed) of the *Pimpinella anisum*. *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This plant is sometimes cultivated in our gardens, and flowers in July and August; its root is annual and fusiform; the stem rises about a foot in height, and is upright, branched, striated, jointed, and smooth. The leaves on the upper part of the stem are divided into narrow pinnated segments, but at the bottom they are roundish, separated in three or five indented lobes, and stand upon scored sheathlike footstalks; the flowers are small, white, and placed in umbels, which are terminal, flat, without involucres. The seeds are oblong, swelling, striated, and of a dingy green colour.

Aniseed should be free from mustiness, and, when rubbed in the hands, exhale its peculiar aromatic odour. The small and more compact seed, imported from Spain, is usually preferred to the lighter and larger kind, which is the growth of this country. Its taste is warm and sweet. By distillation it affords an essential oil, in the average proportion of about two pounds from each hundred-weight of seed. This oil is generally imported, for pharmaceutical use, from Spain. At about 50° it concretes, and, as this is a leading character, it should be attended to in its purchase. It is said that spermaceti is sometimes added to increase its tendency to congeal; a fraud which would be detected by the action of cold alcohol, which would dissolve the oil and leave the adulteration; or simply by careful evaporation, or distillation with water. Oil of aniseed, and spirit of aniseed, or spirituous liquors flavoured with it, are often used as stomachics and carminatives: in these respects, however, it is of little importance as an article of the Materia Medica. The great consumption of foreign oil of aniseed seems to be in the preparation of horse medicines.

Genuine *oil of aniseed* is at first nearly colourless, but acquires a yellow tint when kept; its specific gravity is about ·985. Its tendency to crystallize is said to diminish with age. The concrete part, when pressed in blotting paper, acquires a granular character; it fuses at about 65° or 70°. It is a little heavier than water. At 50° it is soluble in 4 parts of alcohol, but at 60° its solubility is much greater. Its ultimate composition is stated as follows, by Saussure (*Ann. de Chimie et Physique*, XIII. 280):—

	Atoms.	Equivalents.	Per Cent.
Carbon	13	78	83·87
Hydrogen	7	7	7·53
Oxygen	1	8	8·60
Anise Camphor	1	93	100·00

SPIRITUS ANISI.	SPIRIT OF ANISE.
℞ Anisi contusi, uncias decem,	Take of Anise, bruised, ten ounces,
Spiritûs tenuioris, congium,	Proof Spirit, one gallon,
Aquæ, octarios duos;	Water, two pints;
Misce; tum lento igne destillet congius.	Mix; then let one gallon distil, by a gentle fire.

This is a good carminative and antiflatulent, and when sweetened, forms a *liqueur*, which is much esteemed abroad, though to most persons the flavour of anise is not agreeable. The above and similar solutions of essential oil in spirit are sometimes prepared extemporaneously, by dissolving the respective essential oils in alcohol, more or less diluted; but they are then apt to remain milky, unless a stronger than proof spirit be employed. Spirit of anise is scarcely ever prescribed, and might have been omitted without inconvenience.

ANODYNES (from *α*, *without*, and *οδυνη*, *pain*). Remedies which diminish or relieve pain (*see* NARCOTICS and SEDATIVES).

ANTHELMINTICS (from *αντι*, *against*, and *ελμινς*, *a worm*). Remedies against worms. Vermifuges.

ANTHEMIS (from *ανθειν*, *to blossom*). Chamomile. The single flowers of the *Anthemis nobilis*. *Cl.* 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Compositæ Corymbiferæ.

The roots of this plant are perennial, fibrous, and spreading: the stems slender, round, trailing, hairy, branched, of a pale green colour, and about a foot long. The leaves are doubly pinnated; the pinnæ are linear, pointed, a little hairy, and divided into three terminal segments; the flowers are composite, radiated, white, at the centre yellow, and stand singly; the involucre is hemispherical, and composed of several small imbricated scales: the florets of the radius are female, and usually about eighteen, narrow, white, and terminated with three small teeth; the tubular part of the floret encloses the whole of the style, but does not conceal the bifid reflexed stigma; the florets of the disc are numerous, hermaphrodite, tubular, and cut at the brim into five segments; the filaments are five, very short, and have their anthers united, forming a hollow cylinder; the ovary is oblong; the style short and slender, and furnished with a reflexed stigma; the seed small, irregular.

Chamomile flowers are chiefly supplied for the London market by the cultivators of physical herbs in the vicinity of the metropolis, and are of very different qualities. They should be selected fresh, and should strongly exhale their peculiar fragrancy when rubbed. The large double flowers are sometimes preferred; but, as the virtue chiefly resides in the disc florets, the single kind is best.

Chamomile has long been celebrated as an aromatic bitter; they derive their aroma from essential oil, of which not more than from an ounce and a half to two ounces are obtained from each hundred-weight of the flowers; the produce is, however, very variable: the bitter quality resides in extractive matter. Powder of chamomile flowers was formerly employed in the cure of intermittents, but is now scarcely used, the requisite dose being inconveniently bulky; the best form for its administration is, perhaps, as an electuary.

According to Dr. Heberden (*Commentaries*), the following, taken every night, either in powder or pills, proves signally useful in the relief of flatulency and eructations:—

℞ Pulveris Anthemidis, gr. x.
Piperis longi pulv. gr. iij.
Aloes, gr. j. Misce.

Decoction and infusion of chamomile flowers are often used externally as fomentations, but are little preferable to hot or warm water, excepting that the infused flowers, rolled up in a cloth or flannel, serve to retain the heat of the application.

INFUSUM ANTHEMIDIS.	INFUSION OF CHAMOMILE.
℞ Anthemidis, drachmas quinque,	Take of Chamomile (flowers), five drachms,
Aquæ destillatæ ferventis, octarium;	Boiling Distilled Water, a pint;
Macera per sextam horæ partem in vase levitèr clauso, et cola.	Macerate for the sixth part of an hour, in a vessel lightly covered, and strain.

This infusion has the bitterness, and much of the aroma, of the flowers; and though rarely occurring in prescriptions, is a domestic remedy in general use; the stomachic virtues of a cup of cold chamomile tea taken in the morning, fasting, are well known to those who suffer from want of appetite for breakfast. Warm chamomile tea is usefully employed to assist the operation of an emetic; its tonic qualities render it, perhaps, somewhat preferable to warm water.

Extract of chamomile is omitted in the present Pharmacopœia; it is, however, a good simple bitter, and a useful vehicle for other tonics, when given in pills, its consistence being such as peculiarly to fit it for that form of administration. About forty-eight pounds of extract are yielded by each hundred-weight of good flowers.

Oleum Anthemidis. *Oil of Chamomile.*—This essential oil, when recently distilled, is sometimes of a blue colour; that which is found in the shops is generally foreign, of a yellow or brownish yellow colour, and becomes viscid by age. When fresh, its odour is strong and peculiar, its taste pungent and somewhat nauseous: antispasmodic powers have been attributed to it, and hence it is occasionally added to cathartic pills and powders, to prevent griping. The dose is two or three drops. The following pills have been found useful in indigestion attended with spasmodic pain of the stomach, flatulency, and tendency to costiveness:—

℞ Pulveris Rhei, ʒss.
Aloës, gr. x.
Olei Anthemidis, ♏xx.
Divide in pilulas decem, quarum sumatur una ante prandium et vespere quotidie.

Elæosaccharum of chamomile, or oil of chamomile rubbed up with powdered sugar, is a favourite stomachic remedy in some parts of Germany, but it is not very palatable.

ANTIDOTES (from *αντι*, *against*, and *διδομι*, *I give*). Counter-poisons. The term is sometimes used as synonymous with *specific remedy*.

ANTILITHICS (from *αντι*, *against*, and *λιθος*, *a stone*). Synonymous with lithontriptics. Remedies against stone, or calculus.

ANTIPHLOGISTICS (from *αντι*, *against*, and *φλεγειν*, *to burn*). Remedies against inflammation.

ANTISEPTICS (from *αντι*, *against*, and *σηπειν*, *to putrefy*). Antiputrefactives. Remedies against putrefaction.

ANTISPASMODICS (from *αντι*, *against*, and *σπαω*, *I draw*). Remedies against spasm.

ANTIMONY. *Antimonium; Stibium.* The officinal compounds of this important metal are, the *sesquisulphuret*, the *oxysulphuret*, the *potassio-tartrate* (and its vinous solution), and the *compound powder of antimony.*

The account of these pharmaceutical preparations of antimony will be rendered more useful and intelligible to the student, if prefaced by a short notice of its chemical history.

Antimony was first made known by Basil Valentine, towards the en of the fifteenth century, who is stated to have poisoned a brother mon by administering to him some of its preparations, whence the usual name of the metal is said to be derived (from *αντι, against*, and *μονος*, *a monk*). His *Currus Triumphalis Antimonii* was published in 1624, and contains many important facts and discoveries. The principal ore of antimony is the *sulphuret* (the sesquisulphuret of the Pharmacopœia), commonly called *crude antimony.* It occurs in many of the mines of Europe; it is steel-gray, of a metallic lustre, brittle, and often in prismatic and acicular crystals; from this ore, pure antimony may be obtained as follows:—Mix three parts of the powdered sulphuret with two of bitartrate of potassa, and throw it by spoonsful into a red-hot crucible; then give the whole a red heat, and a button will be found at the bottom of the crucible, which is nearly pure; in this state it is known in trade under the name of *regulus of antimony.* Reduce this to fine powder, and dissolve it in hydrochloric acid; pour this solution into water, which will occasion the precipitation of a white powder (Algaroth's powder), which is to be well washed, dried, and mixed with twice its weight of tartar, and exposed to a dull red heat. The button thus obtained is pure antimony.

Antimony is of a silvery white colour, very brittle, and lamellarly crystalline; it fuses at about 800°, and rises in vapour at a white heat. Its specific gravity is 6·7. Its equivalent is 65.

There are three oxides of antimony, of which the protoxide only is salifiable; the other oxides act the part of acids in reference to bases, and have therefore been termed *antimonious acid*, and *antimonic acid.*

The *protoxide of antimony*, or, to speak more correctly, the *sesquioxide* (in reference to the above equivalent), may be obtained by boiling 50 parts of finely-powdered antimony with 200 of sulphuric acid, to dryness, and washing the dry residue, first with water, and then with a weak solution of carbonate of potassa; a white powder remains, which, when thoroughly edulcorated with hot water, and dried, consists of

	Atoms.	Equivalents.	Per Cent.
Antimony	1	65	84·5
Oxygen	1⅓	12	15·5
Sesquioxide of Antimony	1	77	100·0

This sesquioxide is the base of emetic tartar, and of the other active antimonials of pharmacy. It is fusible and volatile at a red heat, undergoing no change in close vessels, but if air be present, it suffers a slow combustion, and passes into *deutoxide;* by nitric acid it is converted into *peroxide* (antimonic acid). It readily dissolves in muriatic acid, and in a hot solution of bitartrate of potassa.

Deutoxide of antimony, or *antimonious acid*, produced by the combustion of the protoxide, is fixed, infusible, and insoluble in nitric acid; it combines by fusion with potassa and soda, and forms compounds soluble in water, from which a precipitate of *hydrated antimonious acid* is thrown down by the acids. It consists of

	Atoms.	Equivalents.	Per Cent.
Antimony	1 . .	65 . .	80·25
Oxygen	2 . .	16 . .	19·75
Antimonious Acid	1 . .	81 . .	100·00

Peroxide of antimony, or *antimonic acid*, is procured by boiling powdered antimony in nitric acid, and exposing the product to a heat of about 500°. It is white, or pale straw colour, tasteless, insoluble in water; it combines with the fixed alkalis by fusion. It may also be obtained by deflagrating antimony with nitre, and so procured, it constituted the *diaphoretic antimony* of old pharmacy. It consists of

	Atoms.	Equivalents.	Per Cent.
Antimony	1 . .	65 . .	76·5
Oxygen	2½ . .	20 . .	23·5
Antimonic Acid . . .	1 . .	85 . .	100·0

Chlorine acts energetically upon antimony, and forms with it a *sesquichloride* and a *perchloride*, corresponding in composition with the *sesquioxide*, and with *antimonic acid.*

Of the remaining compounds of this metal, such as are employed in pharmacy, and directed in the Pharmacopœia, may now be noticed.

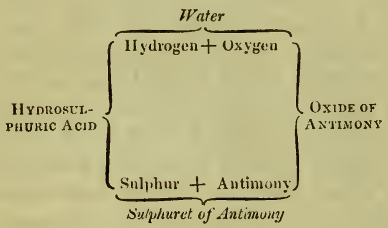
Antimonii Sesquisulphuretum. *Sesquisulphuret of Antimony.* This sulphuret is an abundant natural product, and occurs in most mining districts. It is met with in commerce in cakes or loaves, which have been fused, and exhibit a brilliant steel-gray and radiated or fibrous crystalline texture when broken. In this state it is chiefly imported from Germany and Holland, often contaminated by lead, iron, and arsenic. If lead be present, nitrate of lead is obtained by digesting the powdered sulphuret in nitric acid; iron is recognised by the brown colour produced by deflagration with nitre; and arsenic by its alliaceous odour during volatilization. Exposed to the joint action of a dull red heat and air, the greater portion of the sulphur may be burnt off, and the antimony becomes protoxidized: a slight increase of heat fuses this protoxide, a portion being at the same time volatilized, and the substance on cooling concretes into a reddish-brown vitreous mass, known and imported under the name of *glass of antimony.* It is a protoxide combined with a variable proportion, generally about one-tenth, of sulphuret, and is sometimes a useful article in the pharmaceutical laboratory. It was placed among the articles of the Materia Medica in the former Pharmacopœia, but is now omitted.

Sulphuret of antimony has long been discontinued as an internal remedy, except in a few nostrums for rheumatism and gout. It is apt in some cases to excite excessive vomiting and purging; and in others it is inert; its activity apparently depending upon the substances it meets with in the stomach and bowels. It is composed of

	Atoms.	quivalents.	Per Cent.
Antimony	1	65	73
Sulphur	1½	24	27
Sesquisulphuret of Antimony	1½	89	100

ANTIMONII OXYSULPHURETUM.	OXYSULPHURET OF ANTIMONY.
℞ Antimonii Sesquisulphureti contriti, uncias septem, Liquoris Potassæ, octarios quatuor, Aquæ destillatæ, congios duos, Acidi Sulphurici diluti, quantum satìs sit;	Take of Sesquisulphuret of Antimony, powdered, seven ounces, Solution of Potassa, four pints, Distilled Water, two gallons, Diluted Sulphuric Acid, as much as may be sufficient;
Antimonii sesquisulphuretum, liquorem potassæ et aquam inter se misce, et coque igne lento per horas duas, subindè movens, adjectâ sæpè aquâ destillatâ, adeò ut eandem mensuram circiter impleat. Liquorem cola, eique instilla paulatim acidi sulphurici diluti quantum satìs sit ad oxysulphuretum antimonii dejiciendum; tum aquâ, potassæ sulphatem ablue, et quod restat leni calore exsicca.	Mix the sesquisulphuret of antimony, solution of potassa, and water together, and boil over a slow fire for two hours, occasionally stirring, distilled water being often added, so that it may fill about the same measure. Strain the liquor, and gradually drop into it as much dilute sulphuric acid as may be sufficient to throw down the oxysulphuret of antimony; then with water wash away the sulphate of potassa, and dry what remains by a gentle heat.
NOTA.	NOTE.
Antimonii Oxysulphuretum. In acido nitrico-hydrochlorico totum liquatur, acidum hydrosulphuricum ejiciens.	*Oxysulphuret of Antimony.* It is entirely soluble in nitro-hydrochloric acid, emitting hydrosulphuric acid.

When sesquisulphuret of antimony is boiled in a solution of potassa, mutual decomposition is effected to a variable extent, and sulphuret of potassium and sesquioxide of antimony are formed and retained in the liquid, which, after having been filtered, yields, on the addition of dilute sulphuric acid, a precipitate of hydrosulphate of sesquioxide of antimony, mixed with sulphate of potassa; the latter being washed away, the hydrosulphate remains in the form of a reddish-brown powder, which, when heated, is resolved into sulphuret of antimony and water, as shown in the annexed diagram.



Hence a question has sometimes arisen, whether this compound is to be regarded as a true hydrosulphate, or as a hydrated sulphuret.

Mr. Phillips states, that the composition of the oxysulphuret of antimony, as it is here called, is very uncertain; a specimen which he examined consisted of

Sesquioxide of Antimony	12·0
Sesquisulphuret of Antimony	76·5
Water	11·5
	100·0

This variability in the result of the above process, renders the preparation objectionable in reference to its medicinal employment, and its operation is always uncertain. It has been used as an alterative and diaphoretic, in herpetic and other cutaneous eruptions, and in chronic rheumatism; in such cases it is sometimes combined with calomel, as in the *pilulæ hydragyri chloridi compositæ*, a formula originating with Dr. Plummer, unchemical in its nature, and uncertain in its effects. When oxysulphuret of antimony is prescribed, the dose should be small at first, and gradually increased. Half a grain will suffice to begin with, and from two to three grains usually nauseate, purge, or vomit. In chronic rheumatism, it is occasionally prescribed with small doses of opium, of henbane, or of hemlock, conjoined with mercurials, as in the following formulæ:—

℞ Antimonii Oxysulphureti, gr. v.
Pilul. Hydrargyr.
Extract. Hyoscyami, āā ℈j.
Misce ut fiat massa in pilulas decem dividenda, quarum sumatur una ter die.

℞ Antimonii Oxysulphureti,
Hydrargyri Chloridi, āā gr. ss.
Extracti Conii, gr. iv.
Fiat pilula ter die sumenda.

With these, half a pint to a pint of decoction of sarsaparilla may be taken during the day, and as they keep up perspiratory action, sudden changes of temperature and exposure to cold should be avoided.

The emetic properties of the oxysulphuret of antimony are apt to be augmented by acids, so that they should be avoided during its use, and where they are likely to prevail in the stomach, some corrective, such as aromatic confection, or magnesia, should be united with it, and it should not be made into pills with conserve of roses.

Dr. Paris states, that it is often sophisticated with chalk, and other extraneous matter; that it ought not to effervesce with acids; that it should be entirely vaporizable by heat, and its colour bright orange. He says that a spurious article is vended, which consists of sulphur and sulphuret of antimony, coloured with Venetian red.

ANTIMONII POTASSIO-TARTRAS.	POTASSIO-TARTRATE OF ANTIMONY.
℞ Antimonii Sesquisulphureti in pulverem contriti,	Take of Sesquisulphuret of Antimony, in powder,
Potassæ Nitratis contritæ, singulorum libras duas,	Nitrate of Potassa, powdered, of each two pounds,
Potassæ Bitartratis contritæ, uncias quatuordecim,	Bitartrate of Potassa, powdered, fourteen ounces,
Acidi Hydrochlorici, fluiduncias quatuor,	Hydrochloric Acid, four fluid ounces,
Aquæ destillatæ, congium;	Distilled Water, a gallon;
Antimonii sesquisulphuretum cum potassæ nitrate, adjecto subindè acido hydrochlorico, accuratè misce, et pulverem super laminam ferream inspersum accende. Quod restat, ubi refrixerit,	Accurately mix the sesquisulphuret of antimony with the nitrate of potassa, the hydrochloric acid being added at intervals, and inflame the powder spread upon an iron plate. When what remains

in pulverem subtilissimum tere, et aqua fervente sæpius affusâ lava donec saporis expers sit. Pulverem ità præparatum potassæ bitartrate misce, et coque per horam dimidiam in aquæ destillatæ congio. Liquorem adhuc ferventem cola, et sepone ut fiant crystalli. His demptis et exsiccatis, liquor iterùm consumatur donec in crystallos abeat.

has cooled, rub it into a very fine powder, and wash it with repeated portions of boiling water till it is rendered tasteless. Mix the powder thus prepared with the bitartrate of potassa, and boil it for half an hour in a gallon of distilled water. Filter the liquor whilst hot, and set it aside that crystals may form. Having removed and dried these, let the liquor be again evaporated till it affords crystals.

NOTA.

Antimonii Potassio-Tartras (crystalli). In aquâ penitùs liquatur, nullâ bitartrate vasi adhærente, et acido hydrosulphurico adjecto, quoddam coloris subrubri demittit. Hic liquor, adjecto vel barii chlorido, vel argenti nitrate, nihil demittit. Per acidum nitricum dejicit id, quod ejusdem excessus dissolvit.

NOTE.

Potassio-Tartrate of Antimony (crystals). It is entirely dissolved in water, no bitartrate of potassa adhering to the vessel; and hydrosulphuric acid being added, it deposits a reddish precipitate. This solution, on the addition of chloride of barium, or of nitrate of silver, deposits nothing. By nitric acid it deposits that which excess of the same dissolves.

The entire solubility of crystals of potassio-tartrate of antimony in (a small quantity of) water, is intended to show that it is not mixed with bitartrate of potassa, which, in that case, would remain undissolved. Hydrosulphuric acid precipitates, from this solution, red hydrosulphate of antimony. The absence of sulphuric salts, and of chlorides, is shown by the non-action of chloride of barium, and of nitrate of silver. Nitric acid throws down oxide of antimony, which excess of the acid redissolves.

The potassio-tartrate of antimony should always be purchased in the form of crystals, for when in powder, it is more subject to adulteration and impurities. The crystals should become orange-coloured when dropped into an aqueous solution of hydrosulphuric acid. Mr. Hennell has, however, observed, that potassio-tartrate of antimony may be mixed with as much as 10 *per cent.* of bitartrate of potassa, and yet be soluble in the quantity of water required for the solution of the former salt only. To detect, therefore, such uncombined tartrate, he adds a few drops of a solution of carbonate of soda to a boiling solution of the antimonial salt, and if the precipitate formed be not redissolved, he infers the absence of the bitartrate of potassa.

When sesquioxide of antimony is pure and finely divided, it readily dissolves when boiled with bitartrate of potassa and water, forming the *potassio-tartrate of antimony*, or *emetic tartar;* formerly, finely-levigated *glass of antimony* was used, which is a compound of the sesquioxide with variable proportions of the sulphuret, and when pure, it answered extremely well; but it was liable to be mixed with glass of lead, and subject to other adulterations, so that it has been omitted in the Materia Medica of the present Pharmacopœia. The sesquioxide of antimony prepared by any of the other methods is equally available.

Potassio-tartrate of antimony, when pure, is a colourless salt, which readily crystallizes in octohedra with rhombic bases; by exposure to air the crystals become opaque, from superficial efflorescence; their taste is styptic and metallic, and they are soluble in about 14 parts of cold and 2 of boiling water. When dried at 212°, they lose about 2 *per cent.* of water, and at a higher temperature, 7 to 8 *per cent.* Heated to redness, out of the contact of air, they are entirely decomposed, and leave a highly pyrophoric residue. They consist, according to Mr. Phillips, of

	Atoms.	Equivalents.	Per Cent.
Sesquioxide of Antimony	2	154	42·6
Potassa	1	48	13·3
Tartaric Acid	2	132	36·6
Water	3	27	7·5
Potassio-Tartrate of Antimony (crystallized)	1	361	100·0

In regard to the theory of the above process for the formation of this salt, Mr. Phillips states, that "When nitrate of potassia is mixed and ignited with sulphuret of antimony, rapid combustion ensues; both are decomposed; a portion of the sulphur of the sulphuret combines with part of the oxygen of the decomposed nitric acid, and the result is sulphuric acid, which forms sulphate of potash with the potash of the decomposed nitrate; another portion of the oxygen unites with the antimony of the decomposed sulphuret, and sesquioxide of antimony is formed, which remains mixed with the sulphate of potash and some sulphuret of antimony; and there would also be free potash and sulphuret of potassium, were it not for the hydrochloric acid employed, which saturates the alkali, and either prevents the formation of the sulphuret, or immediately decomposes it when formed. When the residue of the combustion is washed as directed, sulphate of potash and chloride of potassium are removed by it, and a mixture of sesquioxide and sulphuret of antimony remains."

When boiled with the tartar, the oxide is taken up to form the emetic tartar, and the sulphuret remains.

VINUM ANTIMONII POTASSIO-TARTRATIS.	WINE OF POTASSIO-TARTRATE OF ANTIMONY.
℞ Antimonii Potassio-Tartratis, scrupulos duos,	Take of Potassio-Tartrate of Antimony, two scruples,
Vini Xerici, octarium;	Sherry wine, a pint;
Antimonii potassio-tartratem in vino liqua.	Dissolve the potassio-tartrate of antimony in the wine.

This solution, when recently prepared, is a useful form of emetic tartar, but it is liable to occasional deposition, and in an article of so much importance, it is better to direct a solution to be made at the time it is wanted, than to employ a preparation which may be of variable strength.

Potassio-tartrate of antimony is the only officinal preparation of antimony which can be relied on as of definite composition, and it may be medicinally employed as a substitute for all the other compounds of this metal. When given in very small doses, it acts principally upon the exhalents; in larger doses it nauseates, and produces purging and vomiting, together with a more powerful diaphoretic effect; and in still larger doses, it is emetic, and even poisonous, though, in some peculiar cases, it has been administered with comparatively little effect.

As a diaphoretic, it may be given in repeated doses of an eighth of a grain to half a grain, conjoined with saline remedies, in solution.

℞ Antimonii Potassio-Tartratis, gr. j. solve in
Aquæ destill. f℥j.

℞ Solutionis præscriptæ, fʒj.
Liq. Ammon. Acetat. f℥ss.
Mistur. Camphor. fʒx.
Syrup. Aurant. fʒss.
M. fiat haustus tertiâ vel quartâ quâque horâ adhibendus.

℞ Potass. Carbonatis, ʒj.
Succi Limonum recentis, f℥iss. vel q. s. ad saturationem,
Aquæ-Cinnamomi, f℥j.
Aquæ destill. f℥iij.
Solutionis præscriptæ, fʒiij.
Syrupi Tolutani, fʒij.
M. fiat mistura, cujus sumantur cochlearia duo magna omni horâ.

Or, by triturating it with chalk, or with magnesia, it may be so decomposed as to be a substitute for the simple oxide of antimony.

℞ Antimonii Potassio-Tartratis, gr. j.
Cretæ præparatæ,
Sacchari albi, āā ʒss.
Accuratissimè misce, et divide in partes decem æquales, quarum sumat unam secundâ vel tertiâ quâque horâ.

The sudorific action of these powders may be assisted by warm drinks, and may be combined with saline and other diaphoretics; or the dose of the antimonial may be increased, or the interval of its administration diminished, till the desired effect is produced.

For children, the dose of emetic tartar, as a diaphoretic, is from a sixteenth to a fourth of a grain; the latter seldom fails to nauseate. But in all such cases, this, and all other antimonials, should be used with extreme caution, for, in infants especially, they sometimes produce very distressing, and even fatal vomiting.

When emetic tartar is given mixed with chalk or other substance by which it is decomposed, and its oxide separated, it appears to have more tendency to act on the bowels, and less to nauseate, than when in undecomposed solution, or where acids are present. As an alvine evacuant it is, however, principally valuable in conjunction with common purges, which is often remarkably aids in their operation, as in the following formulæ:—

℞ Extract. Colocynth compos.
Extract. Hyoscyam. āā ʒss.
Antimon. Potassio-Tart. gr. ij.
Misce optime ut fiat massa in pilulas xij. dividenda, ij. vel iij. pro dosi.

℞ Magnesiæ Sulphatis, ℥j.
Infus. Sennæ compos. f℥ij.
Aq. Menthæ piper. f℥iv.
Syrup. Zingiberis, fʒij.
Antimonii Potassio-Tartratis, gr. ij.
Misce fiat mistur : cochlearia tria vel quatuor ampla pro dosi.

Emetic tartar is also an important adjunct to expectorants, and with this view is added, in very small doses, to the *pilulæ scillæ compositæ*, the *pilulæ ipecacuanhæ compositæ*, and similar formulæ.

It may here be remarked, that there are many vegetable substances which more or less perfectly decompose emetic tartar, and which are said, though upon doubtful authority, to render it inert. By forming insoluble compounds with it, or with its oxide of antimony, they in many cases diminish its activity as an emetic to a remarkable extent; and hence, in cases of excessive vomiting ensuing from an over-dose, or where it has been taken as a poison, infusion of galls, and especially infusion of yellow bark, have been considered as antidotes. A case is related, upon the authority of Dr. Sauveton, of Lyons, of a lady who swallowed, by mistake, a solution of 60 grains of emetic tartar. In ten minutes, she was seen by her physician, and at this time vomiting had not commenced. Tincture of bark was immediately given in large doses. No unpleasant symptom occurred, except nausea and slight colic.

In these cases, however, the contents of the stomach are generally evacuated by vomiting, and no alarming consequences ensue. But where, from some accidental cause, a large dose of emetic tartar remains long in the stomach before it excites vomiting, dangerous symptoms occur, such as a burning pain at the pit of the stomach, with frequently-recurring fits of vomiting, spasmodic pains of the bowels, excessive purging, inability to swallow, and violent cramps. Sometimes blood is vomited and passed by the bowels, and inflammation of the alimentary canal ensues.

Of the tests for emetic tartar, none is so effective as hydrosulphuric acid. Dr. Turner found that, in a solution containing only the eighth of a grain in the ounce, it produced a decided reddish tint, and when the excess of the gas was expelled by heat, an orange-red precipitate was obtained. Where the salt is present in larger quantity, it is at once thrown down by this reagent, with its characteristic brownish-red colour.

Notwithstanding its virulent emetic effects, and poisonous characters, which in some instances manifest themselves unexpectedly, and as the consequence of comparatively moderate doses, the potassio-tartrate of antimony has been administered as a remedy, to the extent, in divided doses, of ten, twenty, and even thirty grains a day; and, as is said, not only without producing any dangerous irritation of the alimentary canal, but even also not unfrequently without any physiological effect whatever. The disease which has been so treated, is inflammation of the lungs, and the power which enables the body to bear such doses with impunity, is ascribed "to a peculiar diathesis which accompanies the disease and ceases along with it."

This practice has been pursued by Dr. Rasori, of Milan (*Edinburgh Medical and Surgical Journal*, XXII. 277), and by M. Laennec, of Paris

(*Auscultation Mediale*, I. 493). It is said that the same patients who, while the disorder continued, may take large doses without injury, are affected by them in the usual manner, if not rapidly lessened after the disease has begun to give way. Laennec gave as much as two grains and a half every two hours, till twenty grains were taken daily; he once gave forty grains in twenty-four hours, by mistake, without bad effect; vomiting and diarrhœa were seldom produced, and never after the first day. In reference to these extraordinary statements, Dr. Christison observes (*On Poisons*, ART. *Antimony*), that his own observations corroborate them, except as to the effects of large doses during convalescence, of which he has had no experience; and that he has seen from six to twenty grains, when given daily in several doses of one or two grains, check bad cases of peripneumony and bronchitis, without causing vomiting or diarrhœa after the first day, and also without increasing the perspiration. He, however, states that he has twice seen the first two or three doses excite so violent a purging, and pain in the stomach and bowels, as to deter him from persevering in the remedy. "The preceding facts," he says, "unless Rasori's explanation be admitted, are very perplexing, and completely at variance with the facts previously quoted in support of the poisonous effects of tartar-emetic. On a full consideration of the whole circumstances, however, I conceive the conclusion which will be drawn is, that this substance is not so active a poison as was till lately supposed; that in the dose of four, six, and ten grains, it may cause very severe symptoms, but is very uncertain in its action; and that, although there appears to be some uncertainty in the effects of even much larger doses, such as a scruple, yet, in general, violent irritation will then be induced, and sometimes death itself."

The evidence upon this subject which I have been able to collect amounts to this: that it is always highly dangerous to administer emetic tartar in the large doses above adverted to; that vomiting, purging, cramp, and faintings, are their frequent consequences, and that although these may not prove fatal, they are sufficient obstacles to the plan of treatment in those diseases in which it has been thought effectual; and that nothing which has been said regarding the inactivity of emetic tartar invalidates the practical experience of its value as a diaphoretic, nauseant, or emetic, to be prescribed in the usual forms.

I do not think it necessary here to quote the supposed cases of the efficacy of emetic tartar in extremely minute doses, such, for instance, as a grain dissolved in a gallon of water, and used as common drink; yet in such proportion it has been recommended as allaying febrile excitement, and diminishing irritability, in the early stages of phthisis. In the dose of one-eighth to one-sixth of a grain, in conjunction with hemlock, it has no doubt proved serviceable.

As an *emetic*, the potassio-tartrate of antimony is, perhaps, best administered in sufficient and repeated doses till it operates.

℞ Antimon. Tartarisat. gr. iij.
Mistur. Camphor. f℥ix.
M. sumat quartam partem singulis horæ quadrantibus, donec vomitus excitatus sit.

In this way considerable nausea is produced, and the evacuation of the stomach may be completely effected by the aid of warm water or chamomile tea. It is an effective emetic at the commencement of many febrile diseases, and the action upon the skin must be maintained by diluents and keeping in bed. Where, however, a certain and expeditious emetic is required, the following is the common form:—

℞ Antim. Potassio-Tartratis, gr. j.
Ipecacuanhæ pulver. ℈j.
Aquæ Menthæ, f℥j.
Misce pro haustu emetico.

Or the following emetic mixture:—

℞ Ipecac. pulver. ℈ij.
Antimon. Pot.-Tart. gr. ij.
Syrupi Scillæ, f℥ss.
Aquæ Pimentæ,
Aquæ destillat, āā f℥iijss.
Fiat mistura cujus sumantur cochlearia quatuor majora quamprîmum, et cochlearia duo sextâ quâque horæ parte donec supervenerit vomitus.

As an external application, emetic tartar is occasionally employed, in the form of ointment, as a means of producing irritation and a pustular eruption upon the skin, which it does very effectually; but it is seldom thus prescribed, partly on account of the troublesome ulceration which sometimes ensues, and partly in consequence of other rubefacients answering equally as irritants, without such inconvenience. The proportion of tartarised antimony to that of lard, or common white ointment, is about two drachms to one ounce; the salt should be reduced to a very fine powder and very perfectly triturated with the grease.

The following is the formula recommended by Dr. Jenner, in his *Essay on the Influence of Artificial Eruptions on certain Diseases*, who considers the effect not merely limited to superficial irritation, but as extending more deeply; and hence, in certain cases, more effective than cantharides, and similar vesicants:—

℞ Antimonii Potassio-Tartratis, ʒij. tere in pulverem subtilissimum, et adde,
Unguenti Cetacei, ʒix.
Sacchari albi, ʒj.
Hydrargyri Bisulphureti, gr. v.
Misce ut fiat unguentum.

The sugar is here supposed to prevent the ointment becoming rancid.

The application of these ointments to the region of the stomach, has been recommended in whooping-cough, but, independent of the painful, and often troublesome consequences, such treatment, more especially in children, should be adopted with extreme caution, for severe symptoms have in some cases followed the inunction of emetic tartar, arising from its absorption into the system; and a case is related in the *London Medical Repository* (XVI. 357), in which it is supposed to have caused death. The subject was a child two years old, who, soon after the spine had been rubbed with the ointment, was seized with sickness and fainting, which, in forty-eight hours, proved fatal. Indeed, in all cases of the treatment of infants and children, too much circumspection cannot be insisted upon, in reference to the use of powerful and uncertain remedies.

It is also said, that emetic tartar will affect a child through the medium of the milk of the nurse; it is of course difficult to obtain evidence upon this point, but a case is stated in the *London Medical Gazette* (XIII. 496), upon the authority of Dr. Minaret, a French physician, of a young woman who was taking it for pleurisy, and whose infant was attacked with vomiting every time that it sucked the breast.

PULVIS ANTIMONII COMPOSITUS.	COMPOUND POWDER OF ANTIMONY.
℞ Antimonii Sesquisulphureti contriti, libram,	Take of Sesquisulphuret of Antimony, in powder, one pound,
Cornuum rasorum, libras duas;	Horn shavings, two pounds;
Misce et conjice in crucibulum igne candens, et assiduè move donec vapor non ampliùs ascendat. Quod restat in pulverem tere et crucibulo idoneo immitte. Tum ignem subministra et paulatim auge ut candeat per horas duas. Reliquum tere ut fiat pulvis subtilissimus.	Mix, and throw them into a crucible white-hot in the fire, and constantly stir till vapour no longer ascends. What remains, rub into powder, and put it into a fit crucible. Then apply fire, and slowly augment it, that it may be white-hot for two hours. Rub the residue into a very fine powder.

In this process, the sulphur of the sulphuret of antimony is dissipated, along with part of the metal, and that which remains is converted into the deutoxide, or antimonious acid, the composition of which has been above given (p. 67). The horn (which must be stag's-horn, or hart's-horn), is also decomposed, leaving little else than phosphate of lime; so that the residue of the operation is a mixture of antimonious acid and phosphate of lime. When properly prepared, it is a dull white, inodorous and insipid powder, partially soluble in hydrochloric acid, and of little medical activity, in consequence of the state of oxidizement of the antimony.

It has a place in the Pharmacopœia, from its supposed identity with the celebrated nostrum known under the name of *James's powder*, which, according to Mr. Phillips, consists of 56 of antimonious acid, and 44 of phosphate of lime; while two samples of this *pulvis antimonii compositus* afforded respectively 38 and 35 *per cent.* of antimonious acid, and 62 and 65 of phosphate of lime. There is, however, a greater discrepancy in different samples of this preparation than these analyses establish, and this uncertainty of composition renders it so indefinite in its effects, that it is now properly falling into disuse; various combinations of emetic tartar may, in fact, in all cases, be satisfactorily substituted for it.

APERIENTS (from *aperio*, *I open*). Mildly-acting purgatives.

AQUA. Water (probably derived from *Æquus*, *smooth*, or *level*). Our word *water* is of Saxon origin; whence also the German word, *wasser*.

The importance of water as a dietetic, medicinal, and pharmaceutical agent, is too obvious to need comment. In its ordinary state, it is always more or less impure, but it may be easily obtained free from foreign matter, by careful distillation.

Pure water is trasparent, colourless, inodorous, and tasteless, and leaves no residue after evaporation. It is a *protoxide of hydrogen*, being composed of

	Atoms.	Equivalents.	Per Cent.	Volumes.	Sp. Grav.
Hydrogen	1	1	11·1	1·0	0·0694
Oxygen	1	8	88·9	0·5	0·5555
Water	1	9	100·0	1	0·6249

The two last columns show that a volume of the *vapour of water*, or of *steam*, is constituted of one volume of hydrogen and half a volume of oxygen; and hence the specific gravity of aqueous vapour, compared with that of air, is as 0·6249 to 1·0000, for the specific gravity of hydrogen (compared with air) is 0·0694, and half the specific gravity of oxygen is $\frac{1·1111}{2} = 0·5555$; hence, ·0694 + ·5555 = ·6249.

Water is a powerful refractor of light, and a bad conductor of heat, and of electricity. It exhibits a curious anomaly in respect to its maximum of density, which, instead of being just at its point of congelation, as in other fluids, is about eight degrees of Fahrenheit's scale above that point; so that water attains its greatest density, or specific gravity, at about 40°; and as it expands equally on either side of that point, by heat or cold, it follows that water at 32° and at 48°, will be of the same density.

Water is employed as the unit, or standard of comparison, to which the densities of liquids and solids are referred (*see* SPECIFIC GRAVITY). At the temperature of 60°, a cubic inch of water weighs almost exactly 252·5 grains, and the cubic foot 998·217 ounces avoirdupois; now this last number is so near 1000, that the specific gravity of any substance in reference to water, is almost exactly the weight of one cubic foot of such substance, in avoirdupois ounces. The specific gravity of gold, for instance, is 19300 (that of water being assumed as 1000), and of mercury 13500; and a cubic foot of gold weighs very nearly 19300 avoirdupois ounces, and a cubic foot of mercury 13500. Water is about 815 times heavier than air.

At the temperature of 32°, water, under ordinary circumstances, concretes into *ice*, the specific gravity of which is only 0·94 (water being 1·00), so that water, in the act of congelation, expands; and it does this with such force as to burst thick and strong vessels in which it is confined, with irresistible violence; of this, the rupture of iron and leaden water-pipes is a familiar example.

Exposed to heat, in open vessels, water boils, or is rapidly changed into the state of vapour, at the temperature of 212°, but this *boiling point*, as it is called, varies with the pressure of the atmosphere upon the surface of the water; hence, at the top of a high mountain, water boils at a much lower temperature, and in the shaft of a deep mine, at a higher temperature than at the level of the sea; at the top of Mont Blanc, water boils at 184°; and by diminishing or increasing the pressure to a greater extent by other means, a greater variation in the boiling point is observed; so that, in the vacuum of a good air-pump, water will boil at 70°, and under a pressure of 50 atmospheres, at about 510°. In regard to the natural barometrical changes of the atmosphere, the following table shows the relative boiling points:—

Boiling point, in degrees of Fahrenheit.	Barometric pressure, in inches of Mercury.
208°	27·74
209°	28·29
210°	28·84
211°	29·41
212°	29·80
213°	30·60

So that, for every inch of barometric variation, the boiling point varies 1·76°; or a rise or fall in the barometer of 0·1 inch, elevates or sinks the boiling point 0·176°.

Water is absorbed by many porous and pulverulent substances, to a greater or less extent; and when they abstract aqueous vapour from the surrounding atmosphere, they are said to be *hygrometric;* they part with this water in dry states of the air, and may in most cases be dried by exposure to a heat of 212°. But water also enters into combination with solids, in definite proportion; where it thus contributes to the regular form and transparency of crystallized bodies, it is called *water of crystallization;* where this is not the case, the compound is usually termed a *hydrate;* crystals of sulphate of soda, for instance, contain 55·6 *per cent.* of water of crystallization; and caustic potash (hydrate of potassa) contains 16 *per cent.* of water, retained by so powerful an affinity as not to be expelled by a red heat.

Water which has been exposed to the atmosphere, always contains more or less air, which it gives off when boiled, or when exposed under the exhausted receiver of the air-pump. Hence it is that pump water often displays a number of air bubbles, in consequence of drawing it from a deep well. Water retains this air with much obstinacy, so that long boiling is requisite entirely to separate it; and water which has been thus deprived of air, soon again acquires it, either by mere exposure, or by pouring it a few times from one vessel into another. It absorbs oxygen in preference to atmospheric air or nitrogen; and when the air in common water is expelled by boiling, the last portions contain more oxygen than those which are first evolved. But a portion of the air given off by common water, is generally carbonic acid. Dr. Dalton obtained from 100 cubic inches of spring water, two cubic inches of air, which consisted (after the abstraction of from 5 to 10 *per cent.* of carbonic acid) of 38 *per cent.* oxygen, and 62 nitrogen. From 100 cubic inches of the water of a deep spring, Dr. Henry obtained 4·76 cubic inches of air, of which 3·38 were carbonic acid, and 1·38 atmospheric air. But the aëriform contents of common spring water vary in quantity and quality; they also importantly affect the quality of the water; hence that which has been *boiled*, is flat and vapid; and pump water, which has lost some of its included air by exposure, is less agreeable to the palate than that recently drawn from the well.

Aqua Destillata.	Distilled Water.
℞ Aquæ, congios decem; Destillent primùm octarii duo, quibus abjectis, destillent congii octo. Aquam destillatam in lagenâ vitreâ serva.	Take of Water, ten gallons; Let two pints first distil, which being thrown away, let eight gallons distil. Keep the distilled water in a glass bottle.

Any volatile impurities which water is likely to contain, would pass over with the first two pints, which are therefore rejected; the other impurities remain in the residue. The transparency of distilled water should not be disturbed, either by lime water, chloride of barium, nitrate of silver, oxalate of ammonia, or hydrosulphuric acid; the first is a test of carbonic acid, the second of sulphuric acid and sulphates, the third of hydrochloric acid and chlorides, the fourth of lime and its salts, and the fifth of lead and many other metallic impregnations; from all these, pure water should, of course, be free; but when distilled, as it generally is, in a copper still with a pewter worm, traces of copper and of lead are not unfrequently discovered in it, and especially the latter, so that it should always be tested in the ordinary way, by hydrosulphuric acid. If common distilled water be evaporated to an eighth or tenth of its bulk, and then tested, it is seldom that some metallic impregnation will not be evident, but the quantity is almost always too small to deserve serious attention. The *octarium*, or pharmaceutical pint, of distilled water, weighs, at the temperature of 62°, 8750 grains, or ℔j. ℥vj. ʒj. ℈ijss., which is ten grains less than 18¼ ounces *troy-weight.*

Distilled water is employed in all those pharmaceutical preparations and medical formulæ in which the impurities of common water are objectionable; it is vapid to the taste, in consequence chiefly of the absence of air; but some persons have been induced to substitute it for common water, under the idea that the latter, preserved as it usually is in leaden pipes, cannot be free from that pernicious metal. The truth, however, is, that distilled water is more apt to be so contaminated, than rain or spring water, the saline contents of which prevent the solution of, or action upon, lead; whereas the joint action of air and *pure* water soon effect its oxidizement. This important subject, in a medical and medico-legal point of view, has been ably discussed by Dr. Christison (*Treatise on Poisons*, Art. *Lead*), to whom I must refer. Some difference of opinion exists, as to the nature of the white powder which thus forms, and is deposited during the joint action of air and pure water on clean metallic lead. It appears to be a mixture of the hydrated oxide and of carbonate of lead; and as the hydrated oxide is to a small extent soluble, the filtered water affords to sulphuretted hydrogen, and to carbonic acid, a brown and a white cloud; but carbonate of lead is insoluble, so that the oxide dissolved in pure water, if exposed to air, soon becomes carbonated and insoluble. This is the reason why we detect lead in solution, when it has even been for a few minutes in contact with distilled water containing air; but that, after exposure, *dissolved* lead is no longer discoverable. But all common water contains minute portions of certain salts, which, generally speaking, are effective preventives of the action which ensues in pure or distilled water; thus, water containing a two-thousandth part of common salt, or a four-thousandth of sulphate of lime, is for some time without action upon clean lead; at length the surface becomes covered with a whitish film of carbonate of lead, which is insoluble, and no further change is observed, nor can any salt of lead be detected, either dissolved in, or diffused through, the water. It therefore fortunately happens, that the impurities, or usual saline ingredients, of river and spring water, prevent its contamination by our leaden cisterns and pipes; but that distilled water, or any water of extreme purity, would, under such circumstances, become impregnated.

There is another way in which lead is occasionally acted upon by water, and to which attention was first directed by Dr. Paris; it is in consequence of galvanic action, and in cases where iron and lead are in metallic contact, as often happens in the employment of iron bars to strengthen and support leaden cisterns, and in the introduction of iron pumps under similar circumstances; in these cases, though the lead is rendered electro-negative, and so far protected from acid reaction, it becomes more susceptible of, and exposed to, the agency of electro-positive elements, among which are alkalis and alkaline earths, and these exert considerable solvent power over it. So that all such combinations of lead and iron, zinc, &c., should be cautiously avoided.

Lastly, there is another source of contamination of water by lead, which is this; leaden cisterns have often leaded covers, and the water, spontaneously evaporating from the cistern, is condensed (now in the form of *pure*, or *distilled* water,) upon the lid, upon which it exerts its usual energetic action, and drops back into the body of the cistern, contaminated by lead: so that wood, not leaded, should be used in all cases for covering leaden reservoirs.

Rain Water.—This is one of the purest forms in which water can be obtained: when collected in the open country, inland, and upon surfaces over which it exerts no solvent power, it contains air, and carbonic acid; near the sea, it shows traces of chlorine; and of organic matter, ammonia, and various other impurities, when obtained in or near large towns. It is, however, extremely soft, and its specific gravity scarcely exceeds that of distilled water, for which it is, in almost all cases, the best substitute. *Snow water* is also very pure; it is said to contain more oxygen than rain water; this is also said to be the case with *dew*.

Spring Water.—The water of natural springs is in some cases extremely pure; in others, so loaded with foreign matters, as to be unfit for common use, and then usually designated *mineral water*. As, therefore, they vary in purity between these two wide extremes, and as they may hold in solution one or more of all the soluble materials of the strata of the globe, together with various gaseous and organic impregnations, it is impossible to give any general statement of their contents. A certain analogy, however, commonly pervades the spring waters of the same district; thus, the superficial springs in and about London, generally contain sulphate of lime, common salt, carbonate of lime, and smaller portions of some other salts, and are generally so *hard*, as to be unfit for washing, and culinary and domestic uses, such, especially, as making tea; while the deeper springs of the chalk and its adjacent sands, are more pure, and frequently extremely *soft*. This distinction of water into *soft* and *hard*, is derived from its effect on soap, which is perfectly soluble in pure water, but is decomposed by the salts of that which is impure, and with which, insoluble saponaceous compounds are formed; hence the value of an *alcoholic solution of soap*, as a test of the relative softness or hardness of water; or, in other words, of its fitness for washing. The purer the water, the less the turbidness which is produced on dropping into it this test; if it only renders the water slightly opalescent, such water may be termed *soft;* but if it occasions a decided milkiness, or white cloud, it is *hard.* But, in addition to its saline or natural impurities, the *well water* of London is sometimes contaminated by organic matters, the source of which, especially in the pump water of churchyards, is sufficiently obvious; and such is usually the place selected for the parish pump. This disgusting source of water should be avoided; and the disgraceful system of burying the dead in the streets of the metropolis should be authoritatively discontinued. Of this nuisance, abundant instances occur to every one who walks about London; the churchyard of St. Clement's, in the Strand, is a fair specimen; and there are many infinitely worse. In these, the same graves are repeatedly opened, and the coffins thrust in one upon another, according to a most inexplicable system; and it is beneath this superstratum that the waters of the adjacent wells flow, in some instances, perhaps, deep enough to avoid direct contamination, but never free from the suspicion of the oozings of the vicinity.

River Water, being a mixture of spring and rain water, is generally of intermediate purity, except, as in the case of the Thames in London, which receives the whole of the miscellaneous filth of the metropolis, and is liable to many consequent peculiarities. River waters also generally contain a considerable quantity of impurities in mechanical suspension, from which they are freed, either by deposition or by filtration.

The average saline contents of filtered Thames water amount to about twenty grains in the imperial gallon, and are as follow:—

Carbonate of Lime	14·5
Sulphate of Lime	4·0
Common Salt	1·5
	20·0

Traces of magnesian and ammoniacal salts, and of organic matters, are also found, together with other substances, resulting from local contaminations by sewers, gas-works, and various manufactories, which it is impossible to specify, and which, together with suspended and insoluble particles, often render Thames water, in particular places, quite unfit for use.

Much difference of opinion exists as to the relative salubrity of different kinds of water; but, generally speaking, where the amount of foreign matters is not such as to give any decided characters to the water, and to constitute it a *mineral water*, or to interfere materially with its colour, flavour, or transparency, and when these are not of a noxious quality, the saline contents cannot be considered as injurious to health; indeed, it would seem not improbable, that the extreme purity of the water which supplies the valleys of some great mountainous districts, and is chiefly derived from ice and snow, is a cause of glandular affections; on the other hand, we have no evidence that calculous disorders are, as has sometimes been supposed, more prevalent in districts which are watered by rivers loaded with calcareous matter.

ARCHIL, *see* LACMUS.

ARGENTUM. *Silver.*

NOTA.	NOTE.
Argentum. Acido nitrico diluto omne dissolvitur. Hic liquor, adjecto sodii chlorido, demittit id, quod ammoniâ suprà modum additâ liquatur, et coloris expers esse debet. Argenti chlorido amoto, ab acido hydrosulphurico color non inducitur et nihil demittitur. Hujus pondus specificum est 10·4.	*Silver.* It is entirely soluble in dilute nitric acid. This solution, on the addition of chloride of sodium, throws down that which is soluble in excess of ammonia, and should be colourless. The chloride of silver being removed, no colour is induced by hydrosulphuric acid, and nothing is thrown down. Its specific gravity is 10·4.

Total solubility in pure nitric acid, is a character of pure silver, and the solution should be colourless. If of a blue tint, copper is present; and if the silver contain any gold, the latter metal resists the action of nitric acid, and remains in the form of a black powder, soluble in nitro-hydrochloric acid. When the silver has been thrown from its nitric solution by the addition of excess of chloride of sodium, the remaining liquid, after having been filtered, is not discoloured by hydrosulphuric acid, except some other metal be present.

Pure silver is a white and very brilliant metal, fusible at a bright red heat, approaching to a white heat, =, according to Daniell, to 1873° F. It resists the action of air and water; when heated to intense whiteness, as in a flame urged by the oxygen blowpipe, it gradually evaporates. When suddenly cooled, it crystallizes in the act of congelation, throwing up superficial excrescences, from the escape of oxygen; this metal having the curious property of absorbing and retaining oxygen whilst liquid, and suddenly giving it off in the act of congelation. When alloyed with 5 *per cent.* of copper, it no longer possesses this property. The equivalent of silver is 108. It forms one salifiable oxide only, which may be obtained by dissolving the metal in nitric acid, precipitating by baryta water, thoroughly edulcorating the precipitate, and drying it at 212°. It consists of

	Atoms.	Equivalents.	Per Cent.
Silver	1	108	93·10
Oxygen	1	8	6·90
Oxide of Silver	1	116	100·00

This oxide is of a dark olive colour, tasteless, insoluble in water, and easily reduced at a dull red heat to the metallic state. When moist, it combines with ammonia, and forms fulminating silver.

A characteristic property of solutions of silver is that of yielding a white curdy precipitate with chlorine, hydrochloric acid, and the soluble chlorides, which precipitate is insoluble in nitric acid, but soluble in ammonia; it becomes brown, and ultimately black, when exposed, in a moist state, to the action of light; it is a *chloride of silver*, composed of

	Atoms.	Equivalents.	Per Cent.
Silver	1	108	75
Chlorine	1	36	25
Chloride of Silver	1	144	100

The only pharmaceutical use which is made of metallic silver is, for the occasional purpose of silvering pills, which, so enveloped, may be swallowed without being tasted. For this purpose, the recently-made pills are put into a spherical box, with a few silver leaves, and shaken till they acquire a superficial metallic coating.

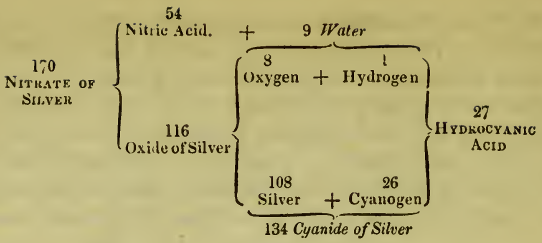
Two preparations of silver are directed in the Pharmacopœia; namely, Cyanuret or Cyanide of Silver, and Nitrate of Silver.

ARGENTI CYANIDUM.	CYANIDE OF SILVER.
℞ Argenti Nitratis, uncias duas et drachmas duas, Acidi Hydrocyanici diluti, Aquæ destillatæ, singulorum octarium;	Take of Silver, two ounces and two drachms, Dilute Hydrocyanic Acid, Distilled Water, of each one pint;
Argenti nitratem in aquâ liqua, iisque acidum hydrocyanicum dilutum adjice, et misce. Quod demissum est, id aquâ destillatâ lava, et exsicca.	Dissolve the nitrate of silver in the water, and add to them the diluted hydrocyanic acid, and mix. Wash that which is thrown down in distilled water, and dry it.
NOTA.	NOTE.
Argenti Cyanidum. Calore cyanogenium ejicit, et in argentum redigitur.	*Cyanide of Silver.* By heat it gives out cyanogen, and is reduced into silver.

Cyanide of silver is precipitated, in the above formula, in the state of a white powder, insoluble in water, and in dilute sulphuric and nitric acids, but soluble in ammonia, and decomposed by hydrosulphuric and hydrochloric acids. It has a place in the Pharmacopœia, as a source of hydrocyanic acid. It consists of

	Atoms.	Equivalents.	Per Cent.
Silver	1	108	80·6
Cyanogen	1	26	19·4
Cyanide of Silver	1	134	100·0

The theory of its production is shown in the following diagram, which illustrates the action of the hydrocyanic acid upon the oxide of silver of the nitrate:



ARGENTI NITRAS.

℞ Argenti, unciam cum semisse,
Acidi Nitrici, fluidunciam,
Aquæ destillatæ, fluiduncias duas;

Acidum nitricum aquâ misce, et in his argentum balneo arenæ liqua. Dein calorem paulatim auge, ut siccetur argenti nitras. Hanc in crucibulo, lento igne, liquefac, donec, expulsâ aquâ, cessaverit ebullitio; tum statim effunde in formas idoneas.

NITRATE OF SILVER.

Take of Silver, an ounce and a half,
Nitric acid, a fluid ounce,
Distilled Water, two fluid ounces;

Mix the nitric acid with the water, and in these dissolve the silver, in a sand-bath. Then gradually increase the heat, that the nitrate of silver may be dried. Melt this in a crucible, by a gentle heat, till, the water being expelled, the ebullition shall have ceased; then immediately pour it into proper moulds.

NOTA.

Argenti Nitras. Principio albet, mox lumine admisso nigrescit. In aquâ omnis liquatur. Hic liquor, cupro immisso, argentum demittit; cætera ut in præcedente.

NOTE.

Nitrate of Silver. It is at first white, but soon blackens upon the admission of light. It is entirely dissolved by water. This solution, copper being immersed, deposits silver. Its other properties are as above (*see* SILVER).

In the above formula, part of the nitric acid is decomposed, its oxygen being abstracted by the silver to form oxide of silver, which is dissolved by the remaining acid to form nitrate of silver. This salt separates in *anhydrous* crystals, the primary form of which is a right rhombic prism. It is soluble in it own weight of water at 60°. When heated, it fuses, (does *not* lose water, as the formula states,) and concretes on cooling into a gray striated mass. It should be cautiously melted in a *silver* crucible, (*ebullition* being carefully avoided, because it indicates *decomposition*,) and the moulds in which it is cast into quills for surgical use, should be warm, and slightly oiled, otherwise the sticks are very brittle. If overheated, it becomes less active as a caustic, and imperfectly soluble in water.

It consists of

	Atoms.	Equivalents.	Per Cent.
Oxide of Silver	1 . .	116 . .	68·23
Nitric Acid	1 . .	54 . .	31·77
Nitrate of Silver	1 . .	170 . .	100·00

LIQUOR ARGENTI NITRATIS.

℞ Argenti Nitratis, drachmam,
Aquæ destillatæ, fluidunciam;

Argenti nitratem in aquâ liqua et cola, tum intercluso luminis accessu, in vase benè obturato serva.

SOLUTION OF NITRATE OF SILVER.

Take of Nitrate of Silver, a drachm,
Distilled Water, a fluid ounce;

Dissolve the nitrate of silver in the water, and filter; then, the access of light being excluded, keep it in a well-stopped vessel.

The principal use of this solution is as a test for detecting the presence of chlorine, which it does with extreme delicacy, as above stated.

The chief employment of nitrate of silver is in surgery, as a caustic; it kills the parts to which it is applied; being much less soluble than pure potassa, and not deliquescent, it is easier of application, and less apt to spread. As it is soluble in water, it may be used in any state of dilution, and is a valuable application in many cases of ulcerating sores, in the proportion of from one to five grains to the ounce of distilled water. The part may be touched twice or thrice a day, with a camel-hair pencil dipped in this solution, which should be of such strength as to occasion smarting. In fistulous sores it is sometimes used as an injection, and it has been recommended as a mouth-wash in scorbutic affections of the gums, and aphthæ of the fauces.

As an internal remedy, nitrate of silver has gained much and apparently deserved credit in the treatment of epilepsy. In this disease it has been administered in doses beginning with an eighth of a grain, and carried up to four or six grains , three or four times a day; it is generally formed into pills with bread-crumb, and the best dose appears to be half a grain thrice a day, gradually increased to a grain and a half or two grains. Under this treatment, the fits often decrease at first in violence, and then in frequency; where the bowels are moderately acted upon, the efficacy of the remedy appears most certain (*Medico-Chirurgical Transactions*, IX. 254). There is a very disagreeable effect which often follows this use of nitrate of silver, which is the discoloration of the *rete mucosum*, so that the surface of the body, and especially those parts most exposed to light, acquire a leaden-gray colour (*Albers and Roget; Med.-Chir. Trans.*, VII. 284). Various means have been resorted to with a view of preventing this effect, or of removing it when it has taken place, but hitherto without success. It is curious that excessive acidity at the stomach is a frequent concomitant of epilepsy, and that Dr. Prout's experiments (*Phil. Trans.*, 1823), have shown that the free acid of the stomach is the hydrochloric, an acid which would decompose the nitrate of silver.

Nitrate of silver has also been employed in other diseases attended by morbid nervous excitement and debility; in certain convulsive affections; in chorea; and in *angina pectoris.*

In over-doses it operates as a corrosive poison; the best antidote is salt and water, by which chloride of silver will be formed, a compound nearly, if not quite, inert. Orfila's results, however, in reference to this counter-poison, were not very satisfactory (*Traité des Poisons*, I. pt. 2, p. 46). It appears to act as a local irritant, and not to be absorbed into the system.

ARMORACIA (from Armorica, the country whence it was brought). *Cochlearia Armoracia ;* Horse Radish. *Cl.* 15. *Ord.* 1. Tetradynamia Siliculosa. *Nat. Ord.* Cruciferæ. *Radix recens ;* the fresh root.

This plant is met with wild; it is cultivated chiefly for domestic use. It has a long white tapering root, and a round erect branched stem, about two feet high: the radical leaves are large, lance-shaped, and waved, crenate, and occasionally pinnatifid; those of the stem are sessile and smaller, lanceolate, and sometimes entire, sometimes divided at the edges; the flowers are in terminal clusters, numerous, and white. The leaves of the calyx are ovate, concave, spreading, and deciduous; the petals obovate, and inserted by narrow claws: the ovary is heart-shaped, bearing a simple permanent style crowned with an obtuse stigma, and changing into an elliptical bilocular silicle containing four seeds in each cell, which are often abortive.

The qualities of horse-radish are too well known to need description; its medical use is unimportant. The acrimony appears to reside in a volatile oil, much of which is lost on drying. 100 parts of fresh root contain, according to Gutret,

Volatile Oil	0·06
Bitter Resin	0·02
Sugar and Extractive	2·73
Gum	3·74
Starch	2·45
Albumen	0·10
Acetic Acid, and Acetate and Sulphate of Lime	0·30
Water	78·10
Woody Fibre	12·50
	100·0

INFUSUM ARMORACIÆ COMPOSITUM.	COMPOUND INFUSION OF HORSE-RADISH.
℞ Armoraciæ concisæ,	Take of Horseradish, sliced,
Sinapis contusi, singulorum unciam,	Mustard Seed, bruised, of each one ounce,
Spiritûs Armoraciæ compositi, fluidunciam;	Compound Spirit of Horseradish, a fluid ounce,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera radicem et semina in aquâ per horas duas, in vase levitèr clauso, et cola; tum adjice spiritum armoraciæ compositum.	Macerate the root and the seed in the water for two hours, in a vessel lightly covered, and strain; then add the compound spirit of horseradish.

This infusion is sometimes employed as a stimulant in paralytic affections, but it is not a good formula, either alone or as a vehicle for other analogous stimulants. When kept, it soon becomes turbid, and in warm weather, or in a warm room, runs into putrefactive fermentation. These objections have almost excluded it from practice. Horse-radish, as a stimulant, is best used as it frequently comes to table, namely, finely grated; and mustard, in its usual form, is also a good medicine; but these, and other vegetables containing gluten and albumen, are apt, in their raw state, to disorder weak stomachs, and excite fetid eructations.

SPIRITUS ARMORACIÆ COMPOSITUS.	COMPOUND SPIRIT OF HORSERADISH.
℞ Armoraciæ concisæ,	Take of Horseradish, sliced,
Aurantii Corticis exsiccati, singulorum uncias viginti,	Dried Orange-peel, of each twenty ounces,
Myristicæ contusæ, drachmas quinque,	Nutmeg, bruised, five drachms,
Spiritûs tenuioris, congium,	Proof Spirit, one gallon,
Aquæ, octarios duos;	Water, two pints;
Misce; tum lento igne destillet congius.	Mix; then, by a gentle fire, let a gallon distil.

This, which is the *Aqua Raphani composita* of the Pharmacopœia of 1720, is one of the antiscorbutic spirits of old pharmacy: as such, it is of no peculiar efficacy; but Dr. Paris recommends it as an adjunct to stimulating diaphoretics and warm cathartics, in the dose of two or three drachms.

ARSENIC. *Arsenicum* (from *αρσενικος*, *strong*, *powerful:* in allusion to its strength as a poison).

The arsenical compounds in the *London Pharmacopœia*, are, *Acidum Arseniosum sublimatione paratum:* Arsenious acid prepared by sublimation; and, among the "Preparations," *Liquor potassæ arsenitis:* Solution of arsenite of potassa.

We shall first describe the general chemical characters of arsenic, then state its pharmaceutical uses, and lastly its effects as poison, and the tests by which it may be most easily and unequivocally recognised.

Arsenic is an extremely brittle metal, of a steel-gray colour; its specific gravity is 5·8. When heated in a sealed tube under the pressure of its own vapour, it may be fused; but in an open tube it rises in vapour at a temperature of about 360°, without entering into fusion. Heated in the air, it easily takes fire, burning with a blueish flame, and producing abundant fumes of its oxide. When long exposed to a moist atmosphere, or when boiled in water, it becomes encrusted with a gray powder, which is an imperfect oxide. Its equivalent number is 38. It has been found *native*, in Saxony, Hanover, Bohemia, France, and Cornwall, generally in the form of nodules of a foliated or lamellar texture.

Arsenic forms two definite compounds with oxygen, both of which have acid characters, and have therefore been termed *arsenious* and *arsenic* acids.

Arsenious acid, or *white arsenic* (the *acidum arseniosum sublimatione paratum* of the Materia Medica), is generally met with in white semitransparent brittle cakes or masses, of a vitreous fracture, but gradually becoming opaque and pulverulent by exposure to air. Its specific gravity is 3·72. It is nearly tasteless, but a virulent poison. By slow sublimation, it may be obtained in tetraedral and octoedral crystals, and also in hexangular tables derived from a rhombic prism. It is volatile at 380°, and its vapour is inodorous, when perfectly free from metallic arsenic; but when heated on metal, or in contact of flame, or anything affording charcoal, or inflammable matter, it smells strongly of garlic. According to Klaproth, 1000 parts of water at 60° dissolve from two and a-half to three of arsenious acid; and 1000 parts of water at 212° dissolve rather more than 77 parts, of which about 30 parts are retained in permanent solution. According to Mr. Phillips, "A thousand parts of water, at mean temperature, are said to dissolve 9·6 parts of transparent, and 12·5 of opaque arsenious acid in 36 hours; the same quantity of boiling water dissolves 97 parts of the transparent kind, of which 18 are retained on cooling, and 79 deposited in the state of small crystals, the form of which is the regular octoedron."

The aqueous solution of arsenious acid slightly reddens litmus, but renders syrup of violets green. 80 parts of alcohol at 60° dissolve one part of arsenious acid. It is also soluble in oils, and in the greater number of acids; and during its crystallisation from a solution in dilute hydrochloric acid, sparks and flashes of light are occasionally perceived. It dissolves in alkaline solutions, and combines with salifiable bases, forming a class of salts termed *arsenites.* Those of ammonia, potassa, and soda are soluble and crystallisable: those of lime, baryta, strontia, and magnesia, are difficultly soluble, and may be formed, together with many others, by precipitation. It is found native. It consists of—

	Atoms.	Equivalents.	Per Cent.
Arsenic	1	38	76
Oxygen	1½	12	24
Arsenious Acid	1	50	100

Arsenious acid should be purchased in lumps; for when in powder it is occasionally adulterated. Among the preliminary *Notes* of the Pharmacopœia, we find the following:—

ACIDUM ARSENIOSUM.	ARSENIOUS ACID.
Igne penitùs sublime fertur. Carbone mixtum et calori expositum, alliaceum odorem emittit. Idem in aquâ fervente liquatur; et adjecto acido hydrosulphurico, materiem flavam demittit; adjecto verò liquore calcis, materiem albam.	It is entirely sublimed by heat. Mixed with charcoal and exposed to heat, it exhales an alliaceous odour. It is soluble in boiling water; and on the addition of hydrosulphuric acid, deposits a yellow precipitate; but on the addition of lime-water, a white precipitate.

Arsenic acid is not included in the *London Pharmacopœia.* It is obtained by distilling nitric acid off powdered metallic arsenic; or by distilling a mixture of four parts of hydrochloric acid, and 24 of nitric acid, off eight parts of arsenious acid, gradually raising the temperature to dull red-heat. Arsenic acid is white, sour, deliquescent, and uncrystallizable. Its specific gravity is 3·4. It is soluble in 6 of cold and 2 of boiling water. The *binarseniate of potassa* formed by heating to redness in a Florence flask a mixture of equal parts of nitre and white arsenic, dissolving the product in water, and crystallising it, has occasionally been used in pharmacy under the name of *Macquer's arsenical salt.*

Arsenic acid consists of

	Atoms.	Equivalents.	Per Cent.
Arsenic	1	38	65·5
Oxygen	2½	20	34·5
Arsenic Acid	1	58	100·0

LIQUOR POTASSÆ ARSENITIS.	SOLUTION OF ARSENITE OF POTASSA.
℞ Acidi Arseniosi in frustula triti,	Take of Arsenious acid, rubbed into small pieces,
Potassæ Carbonatis, singulorum grana octoginta,	Carbonate of Potassa, of each eighty grains,
Tincturæ Lavandulæ Compositæ, fluidrachmas quinque,	Compound Tincture of Lavender, five fluid drachms,
Aquæ destillatæ, octarium;	Distilled water, a pint;
Acidum arseniosum et potassæ carbo-	Boil the arsenious acid and the car-

natem cum Aquæ octario dimidio in vase vitreo coque, donec liquentur. Liquori frigefacto adjice tincturam lavandulæ compositam. Denique adjice insuper aquæ destillatæ quantum satis sit, ut mensuram octarii accuratè impleat.	bonate of potassa with half a pint of water in a glass vessel, till they are dissolved. To the cold solution add the compound tincture of lavender. Lastly add, besides, of distilled water as much as may be sufficient, that it may accurately fill a pint measure.

When the arsenious acid is pure, it readily dissolves in solution of carbonate of potassa, and carbonic acid is evolved. This is the only preparation of arsenious acid which is directed in the *London Pharmacopœia.*

Uses and Effects of Arsenic.—Arsenious acid is employed medicinally as a tonic, in the cure of obstinate intermittents; for this purpose it has long been used in Hungary, and in the fenny districts of Lincolnshire, under the name of *tasteless ague drop.* The only form in which it is advisable to administer it internally, is the preceding *Liquor arsenitis potassæ*, known under the name of "Fowler's Mineral Solution," from having been employed in the treatment of agues and intermitting headache, by Dr. Fowler, of Stafford. When carefully administered, it is generally regarded as an efficacious and safe remedy; but this may admit of doubt: at all events, its effects should be cautiously watched, and if it produce soreness or itching of the eye-lids, tenderness of the mouth, cough, headache, dyspepsia, restlessness, or a quick pulse, or paucity of urine and strangury, it is to be discontinued. Dr. Thomson states that he has given it with decided advantage after cupping and purging, in threatened apoplexy, when the strength was little and the complexion pale; and he sanctions its employment in lepra, in chronic rheumatism, in intermittent hemicrania, or *megrim*, in schirrus, and in some painful affections of the ends of the bones, cartilages, and ligaments. It is said that the Indians are in the habit of administering arsenic in large doses, after the bites of venomous animals; and it would appear from Mr. Ireland's observations (*Medico-Chirurgical Transactions*, II., 397), that it is sometimes an effective remedy. There can, however, be no doubt as to the impropriety of prescribing any form of arsenic, except in cases where other metallic tonics of a less dangerous character have failed, and that it should then be used with the utmost circumspection. Dr. Paris says, "That it is capable of accumulating in the system, I can aver from my own personal experience, and this, in certain habits, may predispose the patient to serious diseases." (*Pharmacologia.*)

The dose of arsenious acid has been variously stated; from a sixteenth of a grain, to a grain, or even more, every four or six hours, and this in the solid form, made into a pill with bread-crumb. The solution of the arsenite of potassa is, however, a more manageable and infinitely preferable form, and as it is not pretended that it is in any case less effective than the free acid, it seems the only arsenical formula that requires notice; of this, the fluid ounce contains four grains of arsenious acid, and the fluid drachm half a grain, and from four to fifteen minims twice a day is said to be a dose. It certainly should not be administered in quantities containing more than an eighth of a grain of the arsenious acid, till its effects upon the patient are fully ascertained; there are, however, cases in which it has been pushed to a much greater extent. The arsenite of potassa is best administered in some simple aromatic water; it may be given, in intermittents, in the intervals of the febrile paroxysms, three or four times daily.

℞ Liquoris Potassæ Arsenitis, minima sex,
Aquæ destillatæ, f℥j.
Spiritus Cinnamomi,
Syrupi Zingiberis, āā fʒj.
Misce fiat haustus sextâ quâque horâ sumendus.

When it gripes the bowels and irritates the stomach, it may be conjoined with aromatics, and with small doses of opium.

℞ Confectionis Aromat. ℈j.
Aquæ Anethi, f℥j.
Tincturæ Opii,
Liquoris Potassæ Arsenitis, āā ♏vj.
M. fiat haustus ter quotidie sumendus.

As an external application, arsenic requires equal caution in its use. It has long been an empyric as well as a regular remedy in the treatment of cancer. *Plunket's ointment* is said to consist of arsenious acid, sulphur, and the powdered flowers of the *Ranunculus flammula* and *Cotula fœtida*, levigated and made into a paste with the white of an egg. *Davidson's remedy* is a mixture of arsenious acid and powdered leaves of hemlock; and the *Pâte arsenicale* of the French surgeons is composed of 72 parts of cinnabar, 22 of *Sanguis draconis*, and 8 of arsenious acid, made into a paste with saliva at the time of applying it. These and similar formulæ have in some instances improved the characters of the sore, but whether in any real case of cancer a cure has been effected, seems very doubtful, and the absorption of the arsenic is stated not unfrequently to have occasioned much mischief. The following are formulæ preferable to the above, where arsenic is thus required:—

℞ Acidi Arseniosi,
Potassæ Carbonatis, āā grana viginti; tere simul et solve in
Aquæ destillatæ, octario. Fiat lotio.

℞ Acidi Arseniosi, ʒj, tere in pulverem subtilissimum,
et adde gradatim
Olei Amygdalæ, fʒij.
Unguenti Cetacei ʒxij.
Misce accuratissime ut fiant unguentum.

It must be remembered, in reference to all these applications, that arsenic is as fatal in its effects when applied to a wound, as when administered internally; it has even been known to produce poisonous effects when applied to the unbroken skin; and further, that it may accumulate in the system, and suddenly show itself with fatal violence. Dr. Paris quotes a case related by L. di Capoa, of a child killed by the violent vomiting and purging arising from a slight wound in the head made by a comb, wet with oil in which arsenic had been infused for the purpose of killing vermin; and another recorded by Desgranges, in which an arsenical pomatum, used for the same purpose, killed a chambermaid.

M. Roux has noticed the case of a girl who was killed by the application of arsenical paste to an ulcer on the breast; and other analogous cases are recorded in which violent and even fatal effects have followed when arsenic has been applied externally, even in small quantities, and not incautiously. They are, at all events, sufficient to suggest the question, whether the employment of arsenic is in any cases justifiable?

We may now advert to the toxicological history of arsenic: to the symptoms which it produces, the mode in which it acts, the treatment to be adopted, and the tests by which it is recognised. Upon these subjects I must refer the reader to authors who have expressly discussed these matters, and more especially to the excellent chapter upon the subject in Dr. Christison's treatise, a few of the leading details in which I shall here endeavour to abridge.

It is generally presumed that arsenic has a two-fold action upon the system; one partly irritant, by which it induces inflammation in the alimentary canal, and elsewhere; and the other indirect, and evinced upon parts and organs remote from its immediate seat of application: the latter is the most generally fatal, for in some cases no symptoms of inflammation occur, and in others, death ensues before any material organic injury has been effected. How this remote action is brought about is still undecided; but the general opinion is, that it is through the blood; it has, however, not been satisfactorily detected there, though, as Dr. Christison remarks, the want of conclusive facts to prove the presence of arsenic throughout the body need not excite surprise, considering the minute quantity in which poisons operate, and the difficulty of detecting such quantities in the blood.

The nature of the remote, or indirect action of arsenic, is also imperfectly understood; it is sometimes called a disorder of the general nervous system, but the symptoms are rather those of depressed action of the heart; though, in the advanced stage of lingering cases, the brain and nerves appear the principal seat of derangement.

Sir Benjamin Brodie, and other physiological experimentalists, have shown that arsenic belongs to those poisons which act nearly with the same energy, whatever be the organ or texture to which they are applied; according to Jaeger, however, it is most active when applied to a fresh wound, or injected into a vein, or introduced into the peritonæal sac; it is less powerful when taken into the stomach; still less when introduced into the rectum; and quite inert when applied to the nerves. But, whatever be the texture to which it is applied, it almost always produces inflammation of the stomach; and in some instances of death caused by its outward application, the inflamed appearance of the stomach has even been greater than when it had been swallowed.

Of the different preparations of arsenic, those which are most soluble appear to be the most active; but in this respect, arseniuretted hydrogen probably exceeds all others. Gehlen died on the ninth day after accidentally inhaling a small portion of it, under the usual symptoms of arsenical poisoning. The smallest actually fatal dose of arsenious acid upon record, is four grains and a half; the subject was a child four years old, and death occurred in six hours. The next smallest dose, cited by

Dr. Christison, is thirty grains; the subject, an adult, died in six days. Hahnemann says, that in circumstances favourable to its action, four grains may cause death within twenty-four hours, and that one or two grains may prove fatal in a few days; but he refers to no actual cases. Renault found that a single grain killed a large dog, in four hours.

The tendency of habit to modify the action of arsenic is very questionable, and when taken in medicinal doses, the effect is the reverse of familiarising the stomach to it.

The symptoms of arsenical poisoning may be considered under three heads:—

1. There are symptoms of great irritation in the alimentary canal, with excessive general depression, but no distinct disorder of the nervous system. These, which are the most common cases, generally prove fatal, the person seldom surviving more than three days. In the mildest examples, recovery takes place after a few attacks of vomiting, and slight general indisposition for a day or two. The ordinary progress of the symptoms are, faintness, sickness, burning pain at the stomach aggravated by pressure, vomiting of greenish matter sometimes streaked with blood, incessant thirst, hoarseness, and difficulty of speech. There is generally diarrhœa, or tenesmus, and the burning pain increases, and sometimes extends the whole length of the alimentary canal. The breathing is painful; the urinary passages are more or less affected; and convulsive tremors or twitches ensue, accompanied by cramps of the legs and arms. Soon after the vomiting sets in, the pulse becomes small and quick, and often imperceptible, the countenance anxious and collapsed, the eyes red, and aphthæ break out on the velum and palate. Delirium and stupor ensue. Death in general comes on calmly, but is sometimes preceded by convulsions. Such are the commonest symptoms of poisoning by arsenic; they vary as to violence, and are not all present in every instance.

2. The second variety of arsenical poisoning includes those in which death ensues in five or six hours, and in which the prevalent symptoms are those of *narcotism*. The pain and vomiting are slight. There are occasionally convulsions and stupor, and the inflammatory symptoms are the least striking. This modification has only been observed when the dose of the poison was large, when it was in little masses, or when it was in a state of solution. It is not common, and indeed not generally known; Dr. Christison has, however, given an abstract of twelve such cases, which suffice to correct the erroneous opinion, that arsenic *always* produces painful and violent symptoms.

3. The third modification of arsenical poisoning illustrates its occasional action on the nervous system. It occurs chiefly in persons who, from having taken a small quantity, or vomited soon after, are eventually saved; but it has also been met with where death has followed protracted illness. In these cases, the first symptoms are those of the inflammatory variety, and when these begin to recede, various nervous affections follow, of which, the most formidable is coma, the least, a paralysis of the arms and legs, resembling that produced by lead; sometimes epileptic fits, tetanus, or a species of hysteria, or mania, are observed.

Lastly, we may mention the symptoms of *chronic* arsenical poisoning, which occasionally succeed to the acute form, and which are sometimes the result of the long-continued administration of arsenic in very small doses, and have been quoted by some as consequent upon its medicinal exhibition. Of these, the principal are, dyspeptic irritability of stomach, emaciation, fever, desquamation of the cuticle, falling off of the hair, languor, loathing of food, watchfulness, and gradual extinction of the vital energies. Similar to these were the effects of the celebrated *acqua Toffana*, or *acquetta di Napoli*, as enumerated by Hahnemann; namely, a gradual sinking of the powers of life, without any violent symptom; an indescribable feeling of illness, failure of the strength, slight feverishness, want of sleep, lividity of the countenance, and an aversion to food and drink, and all the other enjoyments of life. Dropsy closes the scene, along with black miliary eruptions, and convulsions, colliquative perspiration, and purging.

The morbid appearances on dissection, in cases of death by arsenic, are sometimes comparatively insignificant, especially where it is rapid in its action and where the symptoms are rather narcotic than inflammatory; but in ordinary cases, they also vary considerably. The most usual are, redness of the œsophagus, and especially of the villous coat of the stomach, which is often soft, and easily separable by the nail, or thickened and corrugated, or even actually in places destroyed; and, where death has been protracted beyond two days, it is sometimes ulcerated. In some rare cases the stomach has been perforated. "Destruction of the coats of the stomach, as produced by arsenic," says Dr. Christison, "has been variously described by authors, under the terms erosion, corrosion, dissolution, ulceration; but the correct mode of describing it appears to be by the terms gelatinization, or ulceration, according to the nature of the diseased action by which it is induced. At all events, it is necessary to beware of being misled by the terms erosion, corrosion, and the like, which all convey the idea of a chemical action, while it is well ascertained that a chemical action either does not exist at all between arsenic and the animal tissues, or, if it has existence, tends to harden and condense, rather than dissolve or corrode them. Arsenic is not a corrosive."

The mucous secretion of the inner coat of the stomach is almost always increased in quantity; and another common appearance is a sanguinolent fluid, or even actual blood. Sometimes also, arsenious acid is itself detected, its sparing solubility and adhesion to the stomach having prevented its total evacuation by vomiting: in such cases it may also, of course, be found dissolved in the contents of the stomach. When in solid particles, they are enveloped in mucus, or blood; and sometimes imbedded in little ulcers. They are also, in some instances, rendered yellow by superficial conversion into sulphuret. In all cases, care, however, must be had, not hastily to consider every white powder found in the stomach as arsenic.

Signs of inflammation sometimes pervade part of the intestine, but seldom below the extremity of the duodenum, and rarely reaching the colon; the rectum, however, is occasionally much inflamed; and cases are recorded in which the inner membrane of that gut has been abraded, ulcerated, and redder even than the stomach. In lingering cases, excoriation of the anus, and even gangrene, have been produced. The colon is sometimes in a remarkably contracted state, a circumstance which admits of obvious explanation, for whatever completely empties it, will have the same effect. With regard to the thoracic viscera, redness and congestion of the lungs, and redness of the pleura, of the inner surface of the heart, and of the lining membrane of the windpipe, have at times been observed. The conjunctiva of the eye frequently presents spots of extravasation, and morbid vascularity.

It is sometimes stated, that after death by arsenic, the blood remains fluid, and the body passes with extraordinary rapidity into a state of putrefaction; in other cases, no particular effect of this kind has been observed; and in others, especially where the poison was retained in the body, it has exerted an evident antiputrefactive or preservative power, so that bodies under such circumstances have been exhumed and satisfactorily examined, at periods in which, under ordinary circumstances, they would have been in an advanced state of decomposition.

Treatment of Poisoning by Arsenic.—It is with arsenic as with many other poisons; a number of antidotes have been from time to time proposed, and their efficacy apparently verified by experience, which have afterwards been found ineffectual, and have gradually fallen into disuse In individual cases too, some particular modes of treatment have, from apparently accidental causes, been extremely beneficial, which have entirely failed when tried upon others; hence it is that charcoal, sulphuret of potassium, magnesia, hydrated peroxide of iron, bitter decoctions, oil, and several other remedies, have been alternately extolled and depreciated, and that hitherto, nothing in the remotest degree deserving the name of antidote, has been discovered as applicable to this destructive poison. It might at first appear probable, that substances which form insoluble combinations with arsenious acid would at all events blunt its activity; but this is unfortunately not the case, for though some such compounds might be named, which are insoluble in water, they are nevertheless soluble in the secretions of the stomach. It is apparent also, from the manner in which arsenic occasions death, that much advantage could scarcely be expected from any counter-poison, which should not exert some specific action upon the general system, and with such we are also entirely unacquainted. I am afraid, therefore, that it is worse than mere loss of time to endeavour to relieve the sufferers from this poison upon any such principles.

The vomiting, which is generally occasioned by the poison itself, should be promoted, and if necessary, accelerated, by an emetic of sulphate of zinc; diluents should not be too copiously administered, but only to such an extent as to diminish the exertion of retching; and they should be of such a nature as to stand a chance of enveloping the particles of the poison by their coagulation or viscidity: hence, white of egg diffused in water, milk, mucilage of linseed, thick gruel, arrow-root, and similar auxiliaries, should be preferred to warm water; and if the stomach-pump is employed, the same end should be had in view, for it is not the mere evacuation of the floating contents of the stomach which is desirable, but the removal of the adhering mucus in which the arsenical particles are enveloped. Another important point in this treatment is, to adopt those means which may oppose the progress of inflammatory action, such as blood-letting, mild aperients, and laxative enemata; but in resorting to these, the depressing effects that may be expected must be watched for and combated, chiefly by opium, and sedatives which are not of a stimulating character. The general debility, the slight paralytic affections, and the broken-down health of persons who survive the immediate effects of this poison, are afterwards to be encountered by mild tonics, warm and cold sea-bathing, nervine stimulants, and a close attention to diet, which should be nutritive, but light, milk and farinaceous substances being generally preferable to animal food. Wine and spirituous liquors must be avoided; but ale and beer, in these and similar cases, are often admissible. Particular affections of the stomach and bowels, protracted diarrhœa, and obstinate forms of dyspepsia, must be treated as individual cases may require.

Of the Tests for the discovery of Arsenic.—It would be irrelevant to our object here, to enter in detail into the entire chemical history of arsenic, without which the various tests by which its presence in different states are recognised, can neither be explained nor understood; for these I must refer to the chemical course; and it is highly desirable that the medical student should make himself practically acquainted with the requisite manipulations in reference to this subject, which are few, simple, and easily attained.

The following are the least equivocal tests of the presence of arsenious acid in solution:—

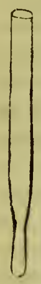
1. *Ammonio-nitrate of Silver.*—This is made by dissolving one part of nitrate of silver in ten parts of water, and gradually dropping in liquid ammonia till the precipitate which first falls is nearly but not quite redissolved. The clear solution is then poured off. It gives a characteristic *lemon-yellow precipitate* of arsenite of silver, in a very dilute solution of arsenious acid, provided no excess either of acid or of ammonia be present.

2. *Ammonio-sulphate of Copper.*—It is prepared by adding liquid ammonia to a solution of one part of sulphate of copper in eight of water, till the resulting precipitate is almost entirely redissolved. The clear solution gives an apple or grass-green precipitate, in a very dilute aqueous solution of arsenious acid; the precipitate is arsenite of copper, and sulphate of ammonia remains in solution. Excess of acids and of bases, and even excess of neutral salts of ammonia, must here be avoided.

3. *Hydrosulphuric Acid* (sulphuretted hydrogen).—When a current of sulphuretted hydrogen is passed through a weak aqueous solution of arsenious acid, a yellow cloud gradually falls, which is sulphuret of arsenic. Any excess of alkali interferes with or prevents the effect; and excess of acid must also be avoided, lest sulphur be thrown down. When the quantity of arsenic present is very minute, the solution will acquire a yellow tint, but no precipitate will ensue till the excess of sulphuretted hydrogen has been expelled by boiling.

It must always be recollected in regard to evidence founded upon these tests, that they are not individually or separately to be relied upon, but that where they concur, they certainly prove the presence of arsenic, for no substance or combination is known which similarly affects each of them. But, to avoid all possibility of doubt, the respective precipitates should be collected, and having been carefully washed and dried, should be heated upon a strip of metal held in the flame of a spirit-lamp, when the characteristic garlic-like odour of metallic arsenic will become perceptible. Lastly, this metallic arsenic should be collected, and further identified. Although it is a highly valuable and correct indication, it is possible that a somewhat similar odour may arise from the evolution of phosphorus. Where paper, candles, and other carbonaceous bodies have been stated to produce alliaceous fumes on burning, arsenic has probably been present; but at all events, the test should be carried to its final result, in order to avoid all possibility of doubt, and the pupil may easily attain the requisite dexterity in effecting this, by practising upon minute portions of white arsenic.

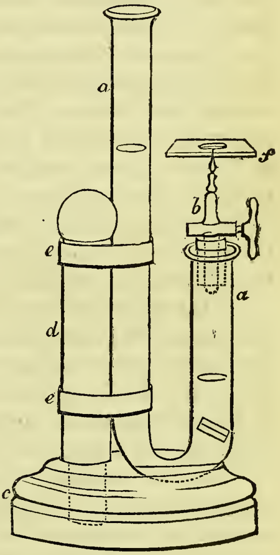
When very small quantities are operated upon, Dr. Christison observes that the proper material for *reduction* is freshly ignited charcoal, by which the whole of the arsenic is disengaged; whereas, with black flux, only part of the metal actually present is evolved. When, however, the quantity of material is considerable, black flux, or a mixture of charcoal and carbonate of soda, is more convenient, as it is not apt to be projected up the tube on the first application of heat. The further directions I abridge from Dr. Christison (*On Poisons*, Art. *Arsenic*). If the quantity operated on is large, it should be mixed with the charcoal or flux before introduction into the tube; if small, it should be dropped into the tube, and covered with charcoal. In the latter case, the best form of tube is that represented in the margin, and the sides of the tube should always be preserved clean.



A spirit-lamp is the best source of heat; and the upper part of the material should be first heated, so that any moisture may be expelled and cleaned out by a small roll of filtering paper: sufficient heat is then applied to sublime the metal, which condenses in the form of a metallic crust, looking much like polished steel. Dr. Turner observes, that additional evidence may be procured by reconverting the metal into arsenious acid, so as to obtain it in the form of resplendent octoedral crystals. This is done by holding that part of the tube to which the arsenic adheres about three-fourths of an inch above a very small spirit-lamp flame, so that the metal may be slowly sublimed; as it rises in vapour it combines with oxygen, and is deposited in crystals within the tube. The character of these crystals is so well marked, that an experienced eye may identify them when their weight does not exceed the hundredth part of a grain. This experiment does not succeed, unless the tube be quite clean and dry.

To the other tests for arsenic many objections have been raised, which it is not requisite to enumerate here, as we have already insisted upon the necessity of the ultimate proof by reduction. It is obvious that where mere *colour* of a precipitate is relied on, numerous causes may make any single test fallacious, though the concurrent results of several such tests may be valid evidence.

Another mode of detecting and identifying arsenic has lately been suggested by Mr. Marsh, of Woolwich, which must be considered as a highly valuable contribution to this important branch of chemistry. It consists in presenting to the arsenic, hydrogen gas in its nascent state, the first action of which is to reduce its oxidized compounds to the metallic state, and then to combine with the metal to form arsenuretted hydrogen, which is detected by its odour, and by depositing metallic arsenic during its combustion.



The requisite apparatus is described by Mr. Marsh as follows:—" *a a* is a glass tube open at both ends, and about three quarters of an inch in its internal diameter. It is bent into the form of a siphon, the shorter leg being about five inches, and the longer about eight inches in length. A stop-cock *b*, ending in a jet of fine bore, passes tightly through a hole made in the axis of a soft and sound cork, which fits air-tight into the opening of the lower bend of the tube, and may be further secured, if requisite, by lute. To fix the apparatus, when in use, in an upright position, a hole is made in the wooden block *c* for the reception of the lower part of the pillar *d*, and a groove is cut in the top of the same block to receive the bend of the tube *a a*. Two elastic slips *e e*, cut from the neck of a common bottle of India rubber, keep the tube firm in its place.

The matter to be examined, if not in the fluid state, such as pastry, pudding, or bread, &c., must be boiled with two or three fluid ounces of clean water, for a sufficient length of time. The mixture so obtained must then be thrown on a filter to separate the more solid parts: thick soup, or the contents of the stomach, may be diluted with water, and also filtered; but water-gruel, wine, spirits, or any kind of malt liquor, and such like, or tea, coffee, cocoa, &c., can be operated on without any previous process.

When the apparatus is used, a bit of glass rod, about an inch long, is dropped into the shorter leg, and this is followed by a piece of clean sheet zinc, about an inch and a half long and half an inch wide, bent double, so that it will run down the tube till it is stopped by the piece of glass rod first put in. The stopcock and jet are now inserted, the cock being left open. The fluid to be examined, having been previously mixed with from a drachm and a half to three drachms of dilute sulphuric acid (1 acid and 7 water), is poured into the long leg, till it stands in the short one about a quarter of an inch below the bottom of the cork. Bubbles of gas soon rise from the zinc, which are *pure hydrogen, if no arsenic be present;* but, if the liquor holds arsenic in any form in solution, the gas will be *arsenuretted hydrogen.* The first portions are allowed to escape, that they may carry with them the small quantity of common air left in the apparatus; after which the cock is to be closed, and the gas will accumulate in the shorter leg, till the liquor has descended below the piece of zinc, when all further production of gas will cease. When the stop-cock is opened, the gas will be propelled through the jet, and, on igniting it, and then holding horizontally a piece of crown or window-glass, *f*, over it, in such a manner as to retard slightly the combustion, the arsenic, (if any be present) will be deposited in the metallic state on the glass: if no arsenic be present, the jet of the flame has a very different appearance; and, although the glass becomes dulled by the deposition of water, yet such is the heat produced, that in a few seconds it becomes perfectly clear, and frequently flies to pieces.

When certain compound liquors are operated on in this apparatus, froth is thrown up, which may choke the jet. The means I adopt to prevent this, is to oil the interior of the short limb of the apparatus before introducing the substance to be examined, or to put a few drops of alcohol or sweet-oil on its surface previously to introducing the stop-cock and its appendages. I have, however, found, if the tube be ever so full of froth in the first instance, that, in an hour or two, if left to itself, the bubbles burst, and the interior of the tube becomes clear without at all affecting the results."

With this apparatus, Mr. Marsh states that he has obtained distinct metallic crusts, when operating on so small a quantity as one drop of Fowler's solution of arsenic, which only contains one-120th part of a grain; and that the presence of arsenic in artificial orpiment and realgar, in Scheele's green, in sulphuret of antimony, &c., may be readily shown, when not more than half a grain of any of those compounds is employed.

The only ambiguity that can arise in this mode of operating is, that some samples of the zinc contain arsenic; it is therefore necessary to determine its purity, and this is easily done by putting a bit of it into the apparatus, with dilute sulphuric acid; the gas thus obtained is to be set fire to as it issues from the jet; and if no metallic film is deposited on the bit of flat glass, and no white sublimate within an open tube, the zinc may be regarded as in a fit state for use.

It only remains to observe, in regard to Mr. Marsh's apparatus, that the presence of antimony may give rise to appearances somewhat resembling those of arsenic; that metal should, therefore, be excluded; or the characters of the deposited arsenic minutely attended to.

When the contents of the stomach, or different articles of food, are to be examined by any of the above methods, the organic substances which they contain often interfere with the tests, and should be removed, if possible, before they are applied. This may sometimes be done by filtration, but if this is inadmissible, they may be evaporated to dryness, avoiding too high a temperature towards the end of the process, and redissolving anew by the action of repeated portions of distilled water, boiled upon the residue.

ARTEMISIA (probably from *Αρτεμις, Diana*). A genus of plants belonging to the natural order *Compositæ*, remarkable for the bitter flavour of many of its species (*see* Absinthium).

ASARUM. *Asarabacca* (from *α*, *priv.* and *σαρειν*, *to adorn;* because it was not admitted into the antient coronal wreaths.) *Asarum Europæum. Folia. Cl.* 11. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Aristolochiæ.

This plant is a native of England, flowering in May. The root is perennial, strong, divided, and fibrous. The leaves rise immediately from the root, growing in pairs; they are kidney-shaped, large, of a deep green, and stand on long footstalks; the flowers are dingy purple, large, bell-shaped, and placed singly upon short peduncles at the base of the footstalks; the calyx supplies the place of a corolla, and is large, bell-shaped, divided at the mouth into three or four pointed segments, which are of a brownish colour, but greenish towards the base. The filaments are twelve, about half the length of the calyx, and furnished with oblong anthers which are attached to the sides of the filaments: from the ovary arises a simple style, crowned with a stigma, which is divided into six radiated reflected parts: the capsule is leathery, and divided into six cells, which contain several small oblong seeds.

The leaves, when dried with little heat, and not kept too long, retain much of their acrimony; they entered into the composition of the *pulvis asari compositus* of former Pharmacopœiæ, which, applied to the nostrils after the manner of snuff, considerably augments the nasal discharge, and has been recommended in ophthalmia and headach, under the name of *herb snuff*. Emetic and cathartic effects follow the internal use of asarabacca leaves, but they are limited in medicine to the former application.

The root of asarum contains a crystallizable volatile oil, resembling camphor, which has been termed *asarin.*

The *pulvis asari compositus* of the *Edinburgh Pharmacopœia* consists of 3 parts of asarabacca leaves, 1 of marjoram leaves, and 1 of lavender flowers.

ASCARIS (from *ασκειν*, to move about). A genus of intestinal worms. Those which infest the human body are the *Ascaris vermicularis*, the thread or maw-worm, which is about half an inch in length, and very slender; and the *Ascaris lumbricoides*, or *round-worm*, which is about the size of a goose-quill, and a foot in length.

ASPARAGIN. A peculiar crystallizable principle contained in the common asparagus. (*Asparagus officinalis*, from *ασπαραγος*, a young shoot, before the leaves are unfolded.)

It was discovered by Vauquelin and Robiquet (*Ann. de Chimie*, LVII.), and was shown by Plisson to be identical with a substance found by Robiquet in liquorice root, which was called *agedoite*, and with the *althein* of the marshmallow root. It is best obtained by evaporating the expressed juice of asparagus to the consistency of syrup; on cooling, it is deposited in transparent crystals, which, when purified, are hard, brittle, of a cooling and slightly nauseous taste, and neither acid nor alkaline. Asparagin is said to be diuretic, and confers upon the urine the peculiar odour which it emits after persons have eaten boiled asparagus. It has also been found in the *Ornithogalum*, and in *Symphitum officinale.*

ASPIDIUM (from *ασπις*, a *shield*). *Aspidium Filix Mas. Rhizoma.* The root-stock of the Male Fern. *Cl.* 2. *Ord.* 1. Cryptogamia Filices. *Nat. Ord.* Filices.

This is a common plant in woods and shady hedge banks, flowering about July. The leaves grow in circular tufts; they are bright green and pinnate: the pinnæ are at first alternate, and increase in size from the base towards the middle: they then decrease towards the summit of the leaf, each being subdivided into linear parallel lobes, crenate on the edges. The fructification is like small dots on the back of each lobe, placed in two rows, and composed of a kidney-shaped indusium, and a pale-brown capsule, with an orange-coloured elastic ring. The root is covered by matted fibres, forming a turfy head of a black colour, and scaly.

The dried fern root-stock (or, as it is commonly called, root) has a bitter flavour, accompanied by a mucilaginous sweetness, and has been long used in doses of about two drachms, as a vermifuge. It is customary to follow it up with a brisk purge of calomel and gamboge, which is probably the most effectual part of the treatment; but we have many better anthelmintics. If used, it should always be freshly dried and powdered; it is scarcely ever found in the shops fit for use.

Geiger obtained from 100 parts of dried male fern root—

Green fixed oil	6·9
Resin	4·1
Saccharine and astringent matter	22·9
Gum and saline substances	9·8
Woody fibre, with some starch	56·3
	100·0

According to Peschier, the root, when taken up at the proper season, namely, in summer, contains a volatile oil, which he assumes to be the active principle, finding that thirty drops of it killed a tape-worm: but probably any other volatile oil would have the same power.

Madame Nouffers' celebrated specific for the tape-worm consisted of two drachms of powdered fern-root, and a calomel and gamboge pill: the former was taken in a cup of water, early in the morning, and the pill was administered two hours afterwards, and was aided in its operation by a subsequent dose of salts. Nothing but broth was allowed during the day, and if the worm was not expelled, the same series of remedies were repeated on the following day.

ASSAFŒTIDA (from the Hebrew word *Asa*, to heal). *Gummi resina.* The gum resin of the *Ferula Assafœtida.* *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This gum resin is obtained from the root of the plant, which, when fully grown, is of a large size, and abounds in milky juice: another species, the *Ferula Persica*, is also sometimes resorted to. The root of the *Ferula assafœtida* is perennial, tapering, and, when fully grown, of the size of a man's leg, and covered with a blackish bark. Its interior is fleshy, white, and juicy. The stem is round, smooth, and striated, rising erect to the height of nine feet, and about seven inches in circumference at the base, surrounded with six or seven radical leaves, nearly two feet long, bipinnate with alternate pinnules, smooth, sinuated, lobed, or lanceolate, of a deep-green colour, and fœtid odour. The flowers are in planoconvex, terminal, compound umbels: the fruit flat, oval, foliaceous, of a reddish-brown colour, rough, with three longitudinal lines; it has an alliaceous odour, and a sharp bitter flavour.

The *Ferula assafœtida* is a native of the south of Persia, and is said to afford the best juice when about four years old. When the leaves and stem decay, they are cut off at the root, and the exudation that takes place at the section being scraped away, a fresh section is made, and so on, till the root has yielded its entire produce. In its recent state it is white and semifluid, but by exposure to the sun it gradually hardens, and assumes a reddish colour.

The best assafœtida is imported in boxes or casks; and we find it in trade in large lumps, made up of irregular agglutinated masses, of a tough consistence, and motley appearance, from the mixture of white drops or tears with others of a violet, red, and brown tint. An inferior kind is full of sand, very fetid, and said to be a compound of garlic, sagapenum, turpentine, and a little real assafœtida.

Assafœtida is stated by pharmaceutical chemists to contain more gum than resin, and to afford about 10 *per cent.* of highly odorous, volatile oil, on distillation with water; so that it deteriorates considerably when kept for a long time. Its taste is acrid, and strongly that of garlic. Its specific gravity is 1·327. It imparts its virtues to alcohol and ether. We have several analyses of assafœtida. Dr. A. T. Thomson obtained from it 10 *per cent.* of essential oil, 30 of resin, and 60 of gum. Brandes states its proximate components as follows:—

Volatile oil	4·2
Bitter resin soluble in ether	47·2
Tasteless resin insoluble in ether	1·6
Extractive	1·0
Gum, with traces of malate, acetate, sulphate, and phosphate of potassa and lime	19·4
Bassorin	6·4
Sulphate of potassa	6·2
Malate of lime	0·4
Carbonate of lime	3·5
Oxide of iron and alumina	0·4
Trace of phosphorus	0·4
Sand and impurities	4·6
Water	6·0
	101·3

The preparations of assafœtida are,
Spiritus Ammoniæ fœtidus, (*see* p. 52),
Pilulæ Galbani compositæ (*see* GALBANUM);
And, the following mixture, and tincture.

Mistura Assafœtidæ.	Mixture of Assafœtida.
℞ Assafœtidæ, drachmas quinque, Aquæ, octarium; Tere assafœtidam cum aquâ paulatim instillatâ, donec intimè misceantur.	Take of Assafœtida, five drachms, Water, a pint. Rub the assafœtida with the water gradually dropped upon it, till they are intimately mixed.

Tinctura Assafœtidæ.	Tincture of Assafœtida.
℞ Assafœtidæ, uncias quinque, Spiritûs rectificati, octarios duos; Macera per dies quatuordecim, et cola.	Take of Assafœtida, five ounces, Rectified Spirit, two pints; Macerate for fourteen days, and strain.

Assafœtida is chiefly employed as a stimulant and antispasmodic in hysteria, hypochondriasis, flatulency, various nervous diseases, and spasmodic cough; as an expectorant in asthma; as a carminative in cholic. It has, also, in common with garlic, been extolled as an anthelmintic. It may be considered as the most efficacious of the fetid gum resins; but its strong and diffusive odour is much against its general use. It may be combined with expectorants, in coughs; and with chalybeates and aloetics in hysteria and chlorosis. The following formula will sometimes allay obstinate attacks of spasmodic cough, and has been found useful in whooping cough:—

℞ Assafœtidæ, ʒj. tere cum
Liquoris Ammon. Acet.
Aquæ destill.
Aquæ Pulegii, āā ℥ij.
Syrupi papaveris, ʒij.
M. cap. cochl. duo pro dosi.

Either of the following are good anti-hysteric, or nervous mixtures; and it is curious that these remedies are often effectual in direct proportion to their bad odour:—

℞ Misturæ Camphoræ, f℥iij.
——— Assafœtidæ, f℥ij.
Tinct. Valerianæ,
Spiritûs Ammoniæ Aromat.
——— Ætheris Sulph. Compos. āā fʒij.
M. fiat mistura, cujus sumantur cochlear. duo ampla subinde.

℞ Spirit. Ammon. fœtid.
Tincturæ Valerianæ, āā fʒiij.
Mistur. Camphoræ, f℥vjss.
Syrupi Croci, fʒiij.
M. Cochlearia tria ampla subinde pro dosi.

In cases of muscular atony of the alimentary canal, Dr. Paris prescribes as follows:—

℞ Ammoniæ Sesquicarbonatis, gr. v.
Assafœtidæ, gr. iv. tere simul et adde
Spirit. Armoraciæ compos. fʒij.
Decocti Aloes compos. fʒx.
Fiat haustus.

For the relief of cholic of the lower bowels, in worm cases, in flatulent cholic, and in the convulsions attending dentition, an enema of assafœtida is sometimes used.

ASTRAGALUS, *see* Tragacantha.

ATROPA (from *Ατροπος*, one of the Fates), *see* Belladonna.

ATROPIA, the alkaloid of the *Atropa Belladonna.*

AURANTIUM (from *aurum*, from its golden colour). *Citrus aurantium. Cl.* 18. *Ord.* 3. Polyadelphia ~~Icosandria~~. *Nat. Ord.* Aurantiaceæ. *Fructus.* The fruit of the orange tree. *Aurantii Flores.* The flowers. *Aurantii oleum. Oleum a floribus destillatum.* The oil distilled from the flowers.

Polyandria

AURANTII CORTEX. *Citrus vulgaris.* The Seville orange. *Fructus cortex exterior.* The outer rind of the fruit.

This beautiful tree is a native of India, but has long been cultivated in the warmer parts of Europe, and will ripen its fruit in our conservatories. We chiefly derive our supplies of oranges from Spain and Portugal.

The orange tree rises to the height of several feet, and sends off many branches covered with a gray bark; the leaves are elliptical, pointed, smooth, entire, of a shining green colour, and stand upon strong winged footstalks. The flowers appear during the whole summer, and are large, white, and arise from the smaller branches upon simple and branched peduncles: the calyx is saucer-shaped, and cut at the brim into five small pointed teeth; the petals are five, oblong, white, concave, and beset with small glands: the filaments are about twenty, united at the base in three or more distinct portions, and furnished with yellow anthers, placed vertically; the ovary is roundish, supporting a cylindrical style, terminated by a globular stigma.

Several varieties of oranges come into the London market. As far as the fruit is concerned, the China, or sweet orange, is preferred, but the rind of the Seville orange is most bitter and aromatic. Orange peel is a very useful stomachic, and as such is added to a variety of bitter and aromatic infusions. It should be thin, bright-coloured, free from the white part, and from mouldiness. The unripe fruit, or berries of the orange tree, commonly called *Curaçoa oranges*, are bitter and aromatic; infused in brandy, they impart flavour to the celebrated Dutch liqueur called Curaçoa. The *Baccæ aurantii* are omitted in the present Pharmacopœia. They are occasionally used in issues, for which purpose they are generally turned into *peas* in the lathe. Water distilled off orange flowers is a very agreeable perfume, and is sometimes employed in prescriptive pharmacy. It is usually imported from Italy, and often contaminated to a serious extent by lead, derived from the vessels in which it is kept, and adulterated with rose and elder-flower water. It is directed as follows in the *London Pharmacopœia:*—

Aqua Florum Aurantii.	Orange Flower Water.
℞ Aurantii Florum, libras decem,	Take of Orange Flowers, ten pounds,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos;	Water, two gallons;
Destillet congius.	Let a gallon distil.

The essential oil of orange flowers, which now has a place in the Materia Medica, is imported from Italy under the name of *Oleum Neroli:* its odour is very inferior to that of the fresh flowers, and rather sickly. It is chiefly used to perfume soap. It becomes brown and viscid by age.

The following are the preparations of orange peel in the *London Pharmacopœia;* it is also added to other tinctures and infusions, to give them a pleasant flavour, and to cover that of nauseous and bitter remedies:—

Confectio Aurantii.	Confection of Orange.
℞ Aurantii Corticis recentis, radulâ separati, libram,	Take of recent Orange Peel, separated by a rasp, a pound,
Sacchari, libras tres;	Sugar three pounds;
Corticem, in mortario lapideo, pistillo ligneo contunde; tum, adjecto saccharo, iterùm contunde, donec corpus unum sit.	Pound the peel in a stone mortar with a wooden pestle; then, having added the sugar, pound it again, till it becomes an uniform mass.

This forms rather an agreeable vehicle for powders which are to be given in the form of electuary, but it loses flavour and becomes hard when kept, and is seldom found in apothecaries' shops in a state of perfection; nor is it often employed. It may be thinned by the addition of syrup of orange peel or of syrup of ginger, as in the following electuary of oxide of iron, a remedy which is sometimes prescribed in large doses in cases of neuralgia.

℞ Ferri Sesquioxidi,
Syrupi Zingiberis, āā ℥ss.
Confectionis Aurantii, ℥jss.
M. fiat electarium, de qua sumatur nucis moschatæ molem bis vel ter quotidie.

Infusum Aurantii Compositum.	Compound Infusion of Orange.
℞ Aurantii Corticis exsiccati, unciam dimidiam,	Take of Dried Orange Peel, half an ounce,
Limonum Corticis recentis, drachmas duas,	Fresh Lemon Peel, two drachms,
Caryophylli contusi, drachmam,	Cloves bruised, one drachm,
Aquæ destillatæ ferventis octarium;	Boiling distilled Water, one pint;
Macera per quartam horæ partem, in vase levitèr clauso, et cola.	Macerate for a quarter of an hour in a lightly-covered vessel, and strain.

This infusion furnishes an agreeable vehicle for small doses of sulphate of magnesia, of ammonia, and of bitter tinctures.

Syrupus Aurantii.

℞ Aurantii Corticis recentis, uncias duas cum semisse,
Aquæ ferventis, octarium,
Sacchari, libras tres;

Macera corticem in aquâ per horas duodecim, in vase leviter operto, tum liquorem effunde, eique saccharum adjice.

Syrup of Orange.

Take of Fresh Orange Peel, two ounces and a half,
Boiling Water, a pint,
Sugar, three pounds;

Macerate the peel in the water for twelve hours in a lightly-covered vessel, then pour off the liquor and add to it the sugar.

Tinctura Aurantii.

℞ Aurantii Corticis exsiccati, uncias tres cum semisse,
Spiritûs tenuioris, octarios duos;

Macera per dies quatuordecim, et cola.

Tincture of Orange.

Take of dried Orange Peel, three ounces and a half,
Proof Spirit, two pints;

Macerate for fourteen days, and strain.

The preceding syrup and tincture have the pleasant flavour of the peel; but the tincture is much improved by being made with fresh orange peel, which, in all cases where it is employed, whether fresh or dry, should be very carefully peeled, extremely thin, and free from the inner coat of the fruit.

AVENA (from *aveo*, I covet; because cattle are so fond of it). *Avena sativa.* *Cl.* 3. *Ord.* 2. Triandria Digynia. *Nat. Ord.* Gramineceæ. Common oat. *Semina integumentis nudata.* The decorticated seed, generally called grits.

It is not known whence the oat was first imported into Europe; its root is fibrous, and the straw rises about two or three feet high: the inflorescence is a loose panicle, with the subdivisions on long pendulous peduncles. The glumes of the calyx are two, marked by lines, pointed, uneven, and larger than the flower. In each pair there are commonly two flowers and grains; they are alternate, conical, the smaller one is awnless; the larger one puts forth a strong two-coloured bent awn from the middle of the back: both grains are fertile.

Oats contain about 74 *per cent.* of nutritive matter, 64 of which may be called starch, and the remainder gluten, with a small proportion of sugar. The straw of oat leaves when burned an ash which abounds in silica.

The importance of *water-gruel* as an article of the diet of invalids is well known; it may be made either with grits or with oatmeal. Grit gruel is made as follows: put three ounces of washed grits into four pints of water, and boil slowly till the water is reduced to one-half; then strain the gruel through a hair sieve.

Dr. Kitchener's receipt to make oatmeal gruel is as follows:—“Ask those who are to eat it if they like it thick or thin; if the latter, mix well together, by degrees, in a pint basin, *one* tablespoonful of oatmeal with three of cold water; if the former, use two spoonsful. Have ready in a stewpan a pint of boiling water, pour this by degrees to the oatmeal you have mixed, return it into the stewpan, set it on the fire, and let it boil for five minutes, stirring it all the time to prevent the oatmeal from burning at the bottom of the stewpan; skim, and strain it through a hair sieve.

"To convert this into *caudle*, add a little ale, wine, or brandy, with sugar, and if the bowels are disordered, a little nutmeg or ginger grated.

"Plain gruel is one of the best breakfasts and suppers that we can recommend to the rational epicure; is the most comfortable soother of an irritable stomach that we know; and particularly acceptable to it after a hard day's work of intemperate feasting, when the addition of an ounce of butter, and a teaspoonful of Epsom salt, will give it an aperient quality, which will assist the principal viscera to get rid of their burden."

For children brought up, as it is called, by hand, equal parts of gruel and cow's milk form the best substitute for the food which nature intended for them; but the greatest attention should be paid to the freshness both of the milk and gruel: in warm weather, or in a warm room, the latter becomes acescent in twelve hours, and will then invariably be mischievous, if not dangerous; the cleanliness of the vessels in which the food is kept and prepared, must also be most strictly looked after; for it often happens that the bowel complaints, and other disorders to which children under such circumstances are liable, arise from inattention to these apparent trifles.

BALSAMODENDRON, *see* MYRRHA.

BALSAM (from *Baal-samen*, Hebrew, *the prince of oils*). This term is applied to many liquid resins; they generally are compounds of resin and volatile oil, such as *Canada Balsam*, *copaiva balsam*, &c.; or, like *Peruvian* and *tolu balsam*, they contain benzoic acid.

BALSAMUM PERUVIANUM. *Balsamum liquidum;* BALSAMUM TOLUTANUM; *Balsamum concretum.* The liquid and the concrete balsams of the *Myroxylon Peruiferum.* *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Leguminosæ.

The tree which affords these balsams grows in the warmest parts of South America, blossoming in August, September, and October; it has a smooth trunk, covered with a gray coarse bark, and abounds in resin. The branches are nearly horizontal, the leaves alternate, and abruptly pinnate. The leaflets in two pairs, nearly opposite, petiolate, ovato-lanceolate, with the apex lengthened and somewhat blunt and emarginate, entire, shining, veined, and very smooth. The midrib, which runs through the whole length of the under surface of the leaf, is raised and pubescent; the common petiole is round and pubescent; the flowers are scattered, on axillary, erect racemes, longer than the leaves. The peduncles are roundish and pubescent; each supported by a small, erect, ovate, concave bracte, appearing to the naked eye like a tubercle: the pedicels erect. The calyx is bell-shaped, dark green, divided into five small, nearly equal teeth, but with one of them so far separated as to be found under the ovary. The corolla consists of five white petals; of which four are narrow, equal, lanceolate, and larger than the calyx; the fifth reflex, broad, and double the size of the others. The stamens are ten, inclining, and inserted into the calyx; bearing elongated, sharp-pointed, sulcated anthers. The ovary is oblong, pedicellated, inclining; the style short, subulate, and crooked, crowned with a simple stigma. The seed-vessel is a straw-coloured, club-shaped, somewhat curved, pendulous legume, globular near the top, and terminated by the curved style. It contains, in a cell in the curved part, one seed only, which is crescent-shaped, and projects from the cell. The substance of the leaves is full of translucent, linear points, like the leaf of the orange-tree.

Peruvian balsam is obtained by boiling the twigs in water: it has a deep brown colour, considerable consistency, a fragrant aromatic smell, and a pungent bitterish flavour. When distilled, it affords benzoic acid, and a resinous matter remains. It is nearly entirely soluble in pure alcohol, leaving a small portion of brown extractive. According to Stoltze, 100 parts of dark-coloured Peruvian balsam yield

Fixed Oil	69·0
Soluble brown Resin	20·7
Difficultly soluble Resin	2·4
Benzoic Acid	6·4
Extractive matter	0·6
Loss	0·9
	100·0

The *spontaneous* exudation of the *M. Peruiferum* is pale-coloured, and of a more purely balsamic odour; it is sometimes called *white Peruvian*, or *Indian balsam*, or *Opobalsamum.* From Tromsdorff's analysis of this variety, it closely resembles tolu balsam.

The medical uses of Peruvian balsam are not very important, and there is much difficulty in obtaining it genuine. It has been prescribed in doses of from half a drachm to a drachm, as a stimulant in chronic rheumatism, and it appears to have been effectual in some obstinate cases. In chronic asthma and old dry coughs it is said to have proved a serviceable expectorant. The best form for its administration is the following:—

℞ Balsami Peruviani, ʒss.
Mucilaginis Acaciæ, ʒij. tere simul, et adde
Aquæ Cinnamomi,
——— Destillatæ, āā f℥ss.
M. fiat haustus ter die sumendus.

Dr. Paris combines it with aloes, in sluggish states of the intestinal canal:—

℞ Bals. Peruviani, ʒij.
Ovi unius vitellum, tere simul et adde
Aquæ Cinnam. f℥vjss.
Tinct. Aloes comp. fʒiij.
Syrup. Croci, fʒij.
Fiat mistura. Dosis f℥iss. bis quotidie.

Mixed with twice its weight of spermaceti ointment, and applied to indolent ulcers, it will sometimes improve and cleanse them. ℥j. of *unguentum cetacei*, made with almond instead of olive oil, and fifteen drops of Peruvian balsam, well mixed by trituration, form an elegant lip-salve. Dr. Thomson observes, that a mixture composed of ʒj. of the balsam and ʒiij. of ox-gall, is useful when dropped into the ear every day, after syringing with solution of soap, in fetid discharges from that organ.

Balsam of Tolu was considered as the produce of a distinct tree, till the publication of Mr. Lambert's *Illustrations of the Genus Cinchona*, in which it is stated, upon the authority of Don H. Ruiz, to be obtained from the *Myroxylon* above described; it flows from incisions made in the bark of that tree, and is collected in mats, and occasionally in gourd-shells, where it acquires consistency; so that it is identical with the *opobalsamum* of old pharmacy. It is of variable quality, and comes into the drug market chiefly in kegs, jars, or canisters.

In cold weather, tolu balsam is brittle, but when kneaded in the warm hand it becomes tenacious. It has a pleasant balsamic smell and taste; when heated, it fuses, inflames, and disperses an agreeable benzoic odour. Distilled with water, it yields a little volatile oil and about 10 or 12 *per cent.* of benzoic acid, and 80 to 90 of resin. When dissolved in solution of potassa, Mr. Hatchett found that it acquired a very peculiar and fragrant odour, resembling that of the clove-pink.

Tolu balsam is placed by writers on the Materia Medica among the stimulating expectorants, and as such has been employed in dry chronic coughs, unattended by inflammatory action, in doses of from five to twenty grains. The chief use now made of tolu balsam is to impart a pleasant flavour to lozenges. It forms an ingredient in the *tinctura benzoini compositi* of the Pharmacopœia, and is the basis of the following preparations:—

SYRUPUS TOLUTANUS.	SYRUP OF TOLU BALSAM.
℞ Balsami Tolutani, drachmas decem, Aquæ ferventis, octarium, Sacchari, libras duas cum semisse; Coque balsamum in aquâ per horam dimidiam in vase levitèr clauso, subindè movens, et liquorem refrigeratum cola; dein saccharum adjice, et liqua.	Take of Balsam of Tolu, ten drachms, Boiling Water, a pint, Sugar, two pounds and a half; Boil the balsam in the water for half an hour in a lightly covered vessel, occasionally stirring, and strain the cold liquor; then add the sugar, and dissolve it.

TINCTURA BALSAMI TOLUTANI.	TINCTURE OF TOLU BALSAM.
℞ Balsami Tolutani, uncias duas, Spiritûs rectificati, octarios duos; Macera donec liquetur balsamum, et cola.	Take of Tolu balsam, two ounces, Rectified Spirit, two pints; Macerate till the balsam is dissolved, and filter.

The preceding *syrup* has a slight flavour derived from the fragrancy of the balsam, and is an elegant adjunct where sugar is required. The *tincture* is used to flavour tolu lozenges, and an extemporaneous syrup may be made by the addition of an ounce of tincture of tolu balsam to fifteen ounces of simple syrup.

BARIUM. The metallic base of *Baryta* (from *βαρυς*, *heavy*). *See* the next article.

BARYTÆ CARBONAS. *Carbonate of Baryta.*

NOTA.	NOTE.
Barytæ Carbonas. Acido hydrochlorico diluto tota liquatur. Hic liquor, adjectâ vel ammoniâ, vel acido hydrosulphurico, nihil demittit et coloris expers est: ubi acidi sulphurici plusquam satis sit ad saturationem adhibitum fuerit, nihil ex liquore supernatante per sodæ carbonatem demittitur.	*Carbonate of Baryta.* It is entirely soluble in dilute hydrochloric acid; this solution, either ammonia or hydrosulphuric acid being added, deposits nothing, and remains devoid of colour: when more sulphuric acid than is sufficient to saturate it is used, nothing is thrown down from the supernatant liquor by carbonate of soda.

This mineral was originally discovered in Lancashire, by Dr. Withering, and was known to mineralogists under the name of *Witherite;* it occurs in other parts of Britain, either crystallized or massive; the latter variety has a radiated structure; its specific gravity is 4·3. Carbonate of baryta is thrown down on the addition of the carbonates of the alkalis to the soluble barytic salts, or by passing carbonic acid through baryta water. It is nearly insoluble in water, and is poisonous. It dissolves with effervescence in dilute hydrochloric and nitric acids. It consists of

	Atoms.	Equivalents.	Per Cent.
Baryta	1	77	77·7
Carbonic Acid	1	22	22·3
Carbonate of Baryta	1	99	100·0

The only pharmaceutical use of baryta is as a source of chloride of barium.

Barium is said to be a white metal, highly attractive of oxygen, and burning when gently heated, into baryta or oxide of barium, which consists of

	Atoms.	Equivalents.	Per Cent.
Barium	1	69	89·6
Oxygen	1	8	10·4
Baryta	1	77	100·0

Baryta is of a gray colour, poisonous, alkaline, and evolving much heat when sprinkled with water, after which it crumbles down into a white *hydrate*, which dissolves in 20 parts of cold and 3 of boiling water.

The soluble barytic salts are valuable tests of the presence of sulphuric acid, and of the soluble sulphates, with which they afford a white precipitate of *sulphate of baryta*, insoluble in water and in dilute acids, and consisting of

	Atoms.	Equivalents.	Per Cent.
Baryta	1	77	65·8
Sulphuric Acid	1	40	34·2
Sulphate of Baryta	1	117	100·0

Sulphate of baryta is an abundant natural product. It may be converted into carbonate of baryta, by heating it red-hot in a silver crucible for half an hour, intimately mixed with three parts of carbonate of potassa; the fused mass, after having been well washed with boiling water, is chiefly carbonate of baryta. By ignition with charcoal, sulphate of baryta is converted into sulphuret of barium.

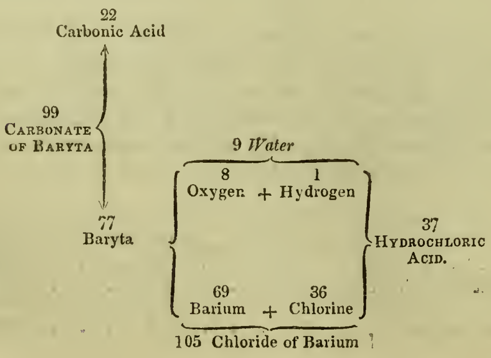
The only officinal barytic preparation is the *chloride*, for which the following formula is given in the *London Pharmacopœia*:—

BARII CHLORIDUM.	CHLORIDE OF BARIUM.
℞ Barytæ Carbonatis in frustula tritæ, uncias decem,	Take of Carbonate of Baryta, rubbed into fragments, ten ounces,
Acidi Hydrochlorici, octarium dimidium,	Hydrochloric Acid, half a pint,
Aquæ destillatæ, octarios duos;	Distilled Water, two pints;
Acidum aquâ misce, iisque barytæ carbonatem paulatim adjice. Tum, calore adhibito, et peractâ effervescentiâ, liquorem cola et decoque, ut fiant crystalli.	Mix the acid with the water, and gradually add to them the carbonate of baryta. Then, on heat having been applied, and the effervescence at an end, filter the solution, and boil it down, that crystals may be formed.

LIQUOR BARII CHLORIDI.	SOLUTION OF CHLORIDE OF BARIUM.
℞ Barii Chloridi, drachmam,	Take of Chloride of Barium, a drachm,
Aquæ destillatæ, fluidunciam;	Distilled Water, a fluid ounce;
Barii chloridum liqua, et cola.	Dissolve the chloride of barium, and filter.

In acting upon carbonate of baryta by hydrochloric acid, the carbonic acid is first expelled, and the baryta and hydrochloric acid so react upon each other as to form water and chloride of barium, which latter salt is retained in aqueous solution. The composition of chloride of barium, and the theory and equivalents of its formation, are shown in the following table and diagram:—

	Atoms.	Equivalents.	Per Cent.
Barium	1 . .	69 . .	65·3
Chlorine	1 . .	36 . .	34·2
Chloride of Barium . .	1 . .	105 . .	100·0



From the preceding diagram it appears, that 99 parts (or one equivalent) of carbonate of baryta, composed of 77 baryta and 22 carbonic acid, require 37 parts (or one equivalent) of hydrochloric acid, composed of 36 chlorine and 1 hydrogen, for decomposition; that the 22 of carbonic acid are expelled in the state of gas, and that the elements of the baryta, and of the hydrochloric acid, reacting upon each other, produce 9 parts (or one equivalent) of water, and 105 (or one equivalent) of chloride of barium.

The crystals of chloride of barium include two atoms of water, and are therefore composed as follows:—

	Atoms.	Equivalents.	Per Cent.
Chloride of Barium	1	105	85·4
Water	2	18	14.6
Crystallized Chloride of Barium	1	123	100·0

The crystals are in the form of rhombic plates. Their specific gravity is 2·82. They are permanent in the ordinary states of the atmosphere, but efflorescent in very dry air, or when moderately heated; at 212° the water is expelled, and at a red heat the chloride fuses. At the temperature of 60°, 40 parts of the crystals dissolve in about 100 of water, and at 222°, which is the boiling point of the saturated solution, 100 of water dissolve 76. The taste of chloride of barium is bitter, acrid, and nauseous.

Chloride of barium was first used medicinally by Dr. Crawford, as a remedy for scrofula and cancer; in the latter disease it is utterly useless; but in scrofula, attacking highly irritable organs, such as the eyes, it has been recommended by Hufeland; and others have extolled its efficacy in cutaneous eruptions. It was at one time supposed to possess antisyphilitic virtues, but its powers over any form or symptoms of that disease, are extremely uncertain and doubtful. It is said to increase the flow of urine and perspiration, and to improve the tone of the system; but it must be administered with caution, as, in over-doses, it produces vertigo, nausea, vomiting, and diarrhœa.

The dose of the above *liquor barii chloridi*, is from five to twenty, or even thirty minims, two or three times a day; and it is generally proper to combine it with some aromatic, and occasionally with opium. It must be remembered, that sulphuric acid, and all the sulphates, render it inert, and that the phosphoric acid, and the greater number of the vegetable acids, form with it compounds which are of difficult solubility.

Baryta, and the greater number of its salts, are powerful poisons; they possess a two-fold action, one local and irritating, the other narcotic. Sir Benjamin Brodie found that ten grains applied to a wound in the back of a rabbit produced palsy, convulsions, and coma; and half an ounce of the solution injected into the stomach of a cat, proved fatal in an hour, although vomiting ensued (*Phil. Trans.* 1812). Orfila injected five grains into the veins of a dog, and death ensued in five minutes, preceded by convulsions (*Toxicologie Générale*). Gmelin found that it produced slight inflammation of the stomach, and strong symptoms of action on the brain, spine, and voluntary muscles, which were destitute of contractility immediately after death, though the heart continued its action. Dr. Christison states, that he has known violent vomiting, gripes, and diarrhœa, produced by a quantity of the chloride not much exceeding the usual medicinal doses. It is curious, that the carbonate is little less active than the more soluble compounds, probably in consequence of its solubility in the acids of the stomach. In fine powder, it is commonly employed as a poison for rats. Orfila found that a drachm of it killed a dog in six hours; vomiting, signs of pain, and an approach to insensibility, preceded death: marks of inflammation were found in the stomach. It is also fatal when applied to wounds. Dr. Wilson has stated a case in which a large dose of the carbonate nearly proved fatal in the human subject. In two hours the patient (a female) complained of headach, double vision, and tinnitus, followed by cramps, vomiting, and purging: the symptoms continued for some days, attended by palpitation (*Medical Gazette*, XIV. 487).

The antidotes to the barytic poisons are, sulphate of soda, or sulphate of magnesia, which should be speedily administered in adequate doses, and which render the poison inert, by converting it into an insoluble sulphate.

BELLADONNA (Ital., *Bella Donna; a handsome Lady:* because used to improve the complexion). *Folia. The leaves* of the *Atropa Belladonna*, or *Deadly Nightshade. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

This plant is indigenous, growing in shady places, flowering in June and July, and ripening its berries in September. It has a thick whitish root, which is perennial, and sends forth strong, branched, annual, purple stems, from three to five feet high. The leaves are of unequal size, entire, oval, pointed, and stand in pairs upon short footstalks. The flowers are of a brownish-purple colour, large, pendent, bell-shaped, furrowed, and the limb cut into five segments. The five filaments are shorter than the corolla, and bear large anthers; the ovary pyramidal, supporting a long simple style, and two-lobed stigma. The ripe berry is large, seated within the calyx, roundish, with a longitudinal furrow on each side, shining, smooth, and of a deep purple colour; it contains a sweetish juice and many seeds.

The leaves of belladonna have a nauseous, bitterish taste, and retain their activity when dried. According to Brandes, 100 parts of the herb yield

Malate of atropia	1·51
Green resin	5·84
Wax	0·70
Varieties of gum	34·28
Albumen soluble	0·70
——— indurated	6·00
Starch	1·25
Salts of ammonia, potassa, lime, and magnesia	7·47
Woody fibre	13·70
Water	25·50
Loss	3·05
	100

The whole of the plant is poisonous, but the seeds and the root are probably the most active parts; it ranks among the narcotico-acrid poisons. The symptoms which it produces are very remarkable; in small quantity, whatever be the part to which it is applied, it causes dilatation of the pupil of the eye. When this effect is produced by its external application, vision is not impaired; but when it is the consequence of its internal administration, the sight is generally obscured. In large doses the symptoms are, dryness in the throat, dilated pupil, delirium, and coma. Convulsions are rare, and, when present, slight. Cases of the poisonous effects of belladonna have been not unfrequently witnessed from the berries having been eaten, though they are perhaps the least active part of the plant. Three or four grains of the powder of the dried root generally produce dangerous consequences; the extract is of variable efficacy, but when carefully prepared, two or three grains of it give rise to alarming symptoms.

In cases of poisoning by belladonna, the pupil is dilated and generally insensible. Another remarkable symptom is delirium, accompanied by immoderate laughter, violent gestures, and sometimes constant talking; but in other cases the voice is lost. Sometimes the state of mind resembles somnambulism. The lethargy which follows is sometimes long in appearing, and variable in degree, and the symptoms are altogether of a protracted character; they have continued for some days, and blindness has remained after the disappearance of the mental aberration. Nervous affections, such as vertigo, imperfect vision, and tremors, may even remain for three or four weeks. Symptoms of excitement, or irritation, are of comparatively rare occurrence; dry and sore throat, difficult deglutition, strangury, and pain of stomach and bowels, have, however, followed large doses, and nausea and vomiting are not unfrequent.

Fatal cases of poisoning by belladonna are rare; as delirium is the most prominent symptom, it excites attention, and emetics may be administered before the poison has been absorbed in sufficient quantity. The treatment consists in evacuating the stomach and bowels, by emetics of sulphate of zinc, and purgatives of an active character. The appearances after death from this poison have been but imperfectly described. Dr. Christison quotes a case from Gmelin (*Geschichte der Pflanzengifte*), the subject of which was a shepherd, who died comatose, twelve hours after eating the berries; but, although the body was examined twelve hours after death, putrefaction had begun; the skin was covered with dark vesicles, and the brain soft. The blood-vessels of the head were gorged, and the blood everywhere fluid, running from the mouth, nose, and eyes.

As the husks and seeds of the berries are very indigestible, some of them will generally be found in the stomach after death; and during life, evidence of the cause of the symptoms may be obtained by the presence of the seeds, husks, or even entire berries in the evacuations. The black husks have been brought away in the stools by laxatives, at least thirty hours after having been swallowed. (*See* CHRISTISON, chap. XXIII.)

The existence of a distinct alkaloid in belladonna was first shown by Brandes, in 1819, and the process for obtaining it was afterwards improved by Mein, in consequence of the discovery of the destructibility of some of those substances by the fixed alkalis which had been inadvertently used in their separation. The following is Mein's process (*Journal de Pharmacie*, xx, 87):—24 parts of the dried root of belladonna, from plants two or three years old, are reduced to fine powder, and digested for several days in 60 parts of alcohol (sp. gr., 825); the tincture is then pressed out, and the digestion repeated; the tinctures are then mixed, filtered, and 1 part of slaked lime is added. After twenty-four hours the liquor is filtered, and dilute sulphuric acid dropped in, till it is slightly acid; the precipitated sulphate of lime is separated by another filtration, and the filtered liquor distilled down to one-half; 6 to 8 parts of water are then added to the residue, which is heated till the whole of the alcohol has passed over, and the bulk reduced to one-third. When cold, a concentrated solution of carbonate of potassa is added drop by drop, till it no longer produces a turbidness, after which the mixture is left at rest for some hours, when, if it is rich in atropia, it forms a jelly, from which the mother water is to be decanted or filtered off, and solution of carbonate of potassa added till it is no longer rendered turbid. The mixture, when gelatinized, often contains groups of stellated crystals of atropia; by agitation, the mother-liquor may be poured off from the gelatinized part, which is then to be separated by pressure in folds of bibulous paper. The impure and moist atropia would lose much if washed in water, so that it must be cautiously dried, again made into a paste with water, and this pressed and dried as before. It may then be dissolved in 5 parts of alcohol, filtered, and diluted with 6 to 8 volumes of water, when it becomes milky, if not immediately, on the evaporation of excess of alcohol; after twenty-four hours the atropia is deposited in yellow crystals, which may be washed with a few drops of water, and dried upon blotting-paper. The root of belladonna, thus treated, furnishes about three-thousandths of its weight of pure atropia.

Atropia forms colourless, silky prisms, soluble in alcohol and ether, and very sparingly in water; the solution is disagreeably bitter, and even when largely diluted, and applied to the eye, occasions dilated pupil. It fuses at a high temperature, and burns with a yellow flame. It forms definite combinations with acids, the acetate and the sulphate having a greater tendency to crystallize than the hydrochlorate or the nitrate. The solutions of these salts give a precipitate of atropia with pure potassa and ammonia; and an abundant precipitate with infusion of galls. Atropia is decomposed by weak solutions of potassa and of soda, and even by lime-water. In contact of water and air, atropia loses its property of crystallizing at common temperatures; hence the crystals, when formed, disappear; the solution acquires a yellow colour, and leaves, on evaporation, an uncrystallizable residue, soluble in all proportions of water, and of a nauseous narcotic odour; it is, however, as poisonous as before. The ultimate elements of atropia, according to Liebig, are,

	Atoms.	Equivalents.	Per Cent.
Carbon	68	408	75·5
Hydrogen	23	23	4·2
Oxygen	12	96	17·8
Nitrogen	1	14	2·5
Atropia	1	541	100.0

The value of belladonna, as a remedial agent, is of a doubtful character. When administered in small doses, it often induces dryness of the fauces, and, if persevered in, vertigo, imperfect vision, and even delirium succeed. It has been used as a sedative diaphoretic in chronic rheumatism, in gout, and whooping cough; some have extolled its powers in schirrus, cancer, paralysis, amaurosis, scrophula, and even in hydrophobia. One grain of the dried and powdered leaves has been given in the form of pill twice or thrice a day, gradually increasing the dose till some sensible effect ensues. An infusion of 20 grains of the dried leaves in 8 ounces of water, has also been employed in doses of from 1 to 2 ounces daily. There is, however, much doubt whether any decided benefit has been obtained by the internal use of belladonna, whilst its occasional mischievous influence is such that there must be difference of opinion as to the propriety of its administration.

As an external application, belladonna may be more safely employed, but even then it requires attention and management. The *emplastrum belladonnæ*, or an ointment consisting of equal weights of lard and of the powder of the recently dried leaves, is often of effectual service in the relief of local pains arising from chronic disease or rheumatism. The ointment, rubbed upon the perinæum, alleviates chordee; and the powdered leaves, sprinkled upon the part, or an infusion of them employed as fomentation, have proved effective in allaying the pain of unhealthy sores. Half a drachm of the dried leaves to half a pint of water furnish an infusion which, when dropped into the eye, causes a dilatation of the pupil that endures for many hours; a circumstance of which oculists sometimes avail themselves, as facilitating the operation for the depression of cataract; and which, by admitting the rays of light more extensively upon the retina, enables persons suffering from incipient cataract to enjoy a temporary improvement of vision.

The only officinal preparations of belladonna in the *London Pharmacopœia*, are the *extract*, which is prepared in the same manner as that of *aconite*, and the following *plaster*. The extract, however, is always of very uncertain powers, a circumstance which the chemical peculiarities of atropia, above stated, will sufficiently explain.

EMPLASTRUM BELLADONNÆ.	PLASTER OF BELLADONNA.
℞ Emplastri Resinæ, uncias tres,	Take of Plaster of Resin, three ounces,
Extracti Belladonnæ, unciam cum semisse;	Extract of Belladonna, an ounce and a half;
Emplastro, calore balnei aquosi, liquefacto, extractum adjice et misce.	To the plaster, liquefied in a water-bath, add the extract, and mix.

BEN, *Oil of.* The oil expressed from the nut of the *Moringa pterygosperma.* It is insipid and inodorous, and may be long kept without becoming rancid; hence it is used in the extraction of the odorous principle of tuberose, jasmin, narcissus, and some other delicate perfumes. *Lignum nephriticum* is the wood of the same plant; it is employed in America as a diuretic and tonic.

BENZOIC ACID. (*See* the next Article.)

BENZOINUM. *Balsamum.* The Balsam of the *Styrax Benzoin. Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Styraceæ.

This tree is a native of Sumatra. It is of a moderate size, of quick growth, and sends off many branches covered with rough gray bark; the leaves are oblong, entire, veined, pointed, smooth on the upper, and downy on the under side; they stand alternately upon short footstalks, which are round, scored, and downy; the flowers are produced in bunches, and usually hang all on the same side upon short slender pedicels; the racemes are nearly of the length of the leaves, branched, downy, and arise from the axillæ of the leaves; the calyx is short, bell-shaped, downy, and divided at the extremity into five obscure imperfect teeth; the corolla is monopetalous, externally ash-coloured, downy, and cut into five obtuse parallel segments, growing close together; the filaments are ten, of the length of the calyx, adhering at the base, bearded towards the top, forming a circle upon the receptacle in which they are inserted, and crowned with linear erect anthers; the ovary is superior, ovate, and downy, and placed above the insertion of the corolla; the style is filiform, longer than the stamina, and terminated with a double stigma; the seeds are of a brown colour.

Benzoin is brought to this country in large masses, packed in chests or casks; it is obtained by annually wounding the bark of six-year old trees. The best benzoin has an amygdaloidal, or mottled appearance. Its specific gravity is 1·063; its colour is pale brown, with white spots. It is of a resinous aspect and fracture, fragrant when warmed, and affording, upon the further application of heat, a sublimate of benzoic acid. It is totally soluble in alcohol. An inferior article is found in the market, indistinctly mottled, of a darker colour, and abounding in impurities. Bucholz obtained from 100 parts of benzoin—

Resin	83·3
Matter like Peruvian balsam . .	1·7
Benzoic acid	12·5
Aromatic extractive matter . . .	0·5
Wood and impurities	2·0
	100

Stoltze analysed white and brown benzoin, with the following results:—

	White.	Brown.
Yellow resin, soluble in ether	79·83	8·80
Brown resin, soluble in ether	0·25	69·73
Benzoic acid	19·80	19·70
Extractive matter	0·00	1·45
Impurities	0·00	0·17
Volatile oil and loss	0·11	0·17
	100	100

By the destructive distillation of benzoin in a glass retort gradually raised to a red heat, I obtained—

Benzoic acid	9·0
Acidulous water	5·5
Butyraceous empyreumatic oil	60·0
Charcoal	22·0
Gases and loss	3·5
	100

Benzoin forms an ingredient in some articles of perfumery, and in fumigating powders and pastiles. It was formerly esteemed as an expectorant, in asthmatic affections, and dry cough, but has fallen into disuse. It is principally employed, at present, as a source of *benzoic acid*, and in the following *tincture:*—

Tinctura Benzoini Composita.	Compound Tincture of Benzoin.
℞ Benzöini, uncias tres cum semisse,	Take of Benzoin, three ounces and a half,
Styracis colati, uncias duas cum semisse,	Styrax, strained, two ounces and a half,
Balsami Tolutani, drachmas decem,	Tolu Balsam, ten drachms,
Aloës, drachmas quinque,	Aloes, five drachms,
Spiritûs rectificati, octarios duos;	Rectified Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

This tincture is chiefly employed as a stimulating application to languid ulcers; it is commonly known under the name of *Friar's Balsam.* Its effects are mischievous when applied to recent wounds. It has been prescribed internally in the dose of ten minims to a drachm in old asthmatic cases, and in chronic bronchitis. It requires to be mixed with water through the medium of mucilage, honey, or yolk of egg.

Two drachms of simple tincture, or alcoholic solution of benzoin, added to a pint of rose water, forms a mixture which is sometimes used as a cosmetic under the name of *virgin's milk.*

Acidum Benzoicum.	Benzoic Acid.
℞ Benzoini libram;	Take of Benzoin, a pound ;
Vasi idoneo arenæ imposito benzoinum immitte, et calore paulatim aucto, sublima, donec nihil amplius ascendat; quod sublimatum est chartâ bibulâ involutum comprime, et a parte oleosâ separa, dein iterùm sublima.	Put the benzoin into a proper vessel, placed in sand, and by heat gradually increased, sublime, till nothing more rises ; press the sublimate wrapped in bibulous paper, and separate it from the oily part, then sublime it again.
Nota.	Note.
Acidum Benzoicum. Calore cautè adhibito, odorem proprium exhalans totum effugit. In aquâ parùm liquatur, copiosiùs in spiritu rectificato. Idem vel in liquore potassæ, vel in liquore calcis penitùs liquatur, et indè per acidum hydrochloricum demittitur.	*Benzoic Acid.* By heat carefully applied, it exhales its peculiar odour, and entirely evaporates. It is sparingly dissolved by water; more copiously by rectified spirit; it is entirely soluble in solution of potassa, or in solution of lime (lime water), and is precipitated (from these solutions) by hydrochloric acid.

This is a simple and economical process, good benzoin thus affording from 10 to 12 *per cent.* of the acid contaminated by empyreumatic oil, and about 8 or 9 *per cent.* of purified acid.

Benzoic acid, as it usually occurs, is in soft flocculent crystals, of an agreeable aromatic odour, sparingly soluble in cold water. Boiling water dissolves about one twenty-fifth of its weight, and deposits it copiously as it cools. Its taste is more pungent than acid, but it reddens delicate vegetable blues.

When benzoic acid is perfectly free from empyreumatic oil, it is inodorous: it may be obtained in long and delicate prismatic crystals, by the slow evaporation of its alcoholic solution. There is an acid closely resembling the benzoic, contained in the urine of horses and cows; it has been termed *hippuric* acid, and is precipitated from such urine by muriatic acid. When perfumed by sublimation with a little benzoin, it is said to be substituted, as an article of commerce, for genuine benzoic acid, and is sold at a comparatively low price.

The equivalent of anhydrous benzoic acid is 113; its ultimate components, according to Dumas, being

	Atoms.	Equivalents.	Per Cent.
Carbon	14	84	74·3
Hydrogen	5	5	4·4
Oxygen	3	24	21·3
Anhydrous Benzoic Acid	1	113	100·0

The *crystallized acid* contains one equivalent of water, which cannot be expelled by heat without decomposition, and is contained in most of the benzoates; in this state, therefore, the equivalent is $113+9=122$.

It has been above stated (page 58), that when the oil of bitter almonds, deprived of hydrocyanic acid, is exposed to air, it becomes converted into benzoic acid: that oil is regarded by Liebig and Wöhler (*Ann. de Ch. et Ph.* LI. 273) as the hydruret of a base which they have termed *benzule*, and which consists of

	Atoms.	Equivalents.	Per Cent.
Carbon	14	84	80·00
Hydrogen	5	5	4·75
Oxygen	2	16	15·25
Benzule	1	105	100·00

And benzoic acid (anhydrous) is the *oxide* of that base; it may thus be represented as a compound of

	Atoms.	Equivalents.	Per Cent.
Benzule	1	105	92·8
Oxygen	1	8	7·2
Anhydrous Benzoic Acid	1	113	100·0

The utility of benzoic acid in medicine is questionable; it was once used as a pulmonic stimulant, in certain catarrhal and asthmatic affections, in doses of from ten to twenty grains. The only compound into which it enters in the present Pharmacopœia, is the *Tinctura camphoræ composita*, in which there is the same quantity of opium, so that the benzoic acid cannot be considered as possessing any efficacy in the doses in which it can there be administered. The best form for its administration is that of pill or electuary. Dr. Paris says, that in certain cases of tracheal irritation, a pill composed of two grains of benzoic acid and three of extract of poppy, has been serviceable; or the following:—

℞ Acid. Benzoici, gr. iij.
Myrrhæ Pulver. gr. x.
Pulver. Tragac. compos. gr. xij.
Fiat pulvis ex melle sumendus.

BERGAMII OLEUM. Oil of Bergamot. *Oleum e fructus cortice destillatum;* the oil distilled from the rind of the fruit of the *Citrus Limetta Bergamium. Cl.* 18. *Ord.* 3. Polyadelphia Icosandria. *Nat. Ord.* Aurantiacæ.

This species of *citrus* bears a small pear-shaped fruit, resembling the *lime*, the rind of which, by expression, or by distillation with water, yields the perfume called *oil of bergamotte.* It is a thin pale yellow oil, of an agreeable odour, between that of lemon and orange oil; its specific gravity is 0·885. It does not congeal till cooled below 0°; when obtained by expression, it deposits a white sediment, which is benzoate of lime. Nitric acid renders it yellowish green, and converts it into a resinous substance. It is of no use in pharmacy, except as a perfume, and, as such, is sometimes added to sulphur ointment, and to liniments. An inferior bergamot oil is known in commerce under the name of *Portugallo.* From the various flavour and odour of the commercial oil of bergamot, it is probably always more or less adulterated, apparently with oil of lemon-peel.

BEZOAR. This word is of Persian origin, and implies *destroyer of poison.* The intestinal concretions of animals were formerly celebrated for their medicinal virtues, and were termed *bezoar-stones*, being distinguished by the names of the countries whence they were derived. The oriental bezoars were most esteemed; such as have been examined are either phosphate of lime and ammonio-magnesian phosphate (these being probably urinary calculi), or they consist chiefly of inspissated bile and cholesterin, being biliary calculi; or they contain hair, fungus, woody fibre, and other analogous substances; three bezoars sent by the King of Persia to the Emperor Napoleon, were chiefly agglomerated vegetable fibre.

In old collections of the Materia Medica, bezoar-stones, set in silver frames, so as to be suspended round the neck, are not uncommon; they were regarded as charms against infection, bore a very high price, and were sometimes let out at a considerable sum by the day. Bezoar-stone was an ingredient in various powders and preparations formerly employed as antidotes and alexipharmics, which hence acquired the name of *bezoardics*. *Gascoign's powder* and *balls* were of this description; and many of them included musk and civet. The term *bezoardicum minerale* has been applied to peroxide of antimony or antimonic acid, obtained by deflagrating sulphuret of antimony with nitre.

BISALTS. Salts containing one atom or equivalent of base, combined with *two* atoms of acid; such as bicarbonate of soda, bisulphate of potassa, &c.

BISMUTHUM. *Bismuth* (Wismuth, *German*).

NOTA.	NOTE.
Bismuthum. Acido nitrico diluto liquatur. Hic liquor ubi ex eo per ammoniam demissa fuerit bismuthi subnitras, coloris expers est. Hujus pondus specificum est 9·8.	*Bismuth.* It is dissolved by dilute nitric acid. This solution, when subnitrate of bismuth has been thrown down from it by ammonia, is free from colour. The specific gravity of bismuth is 9·8.

Bismuth is a brittle reddish-white metal. It fuses at 476°, and acquires a crystallized texture in cooling. If it contain copper, the solution in nitric acid becomes blue by excess of ammonia. Exposed to heat and air, bismuth becomes covered by a fusible white oxide, and it burns brilliantly under a jet of oxygen upon ignited charcoal, throwing off copious fumes of oxide. The equivalent of bismuth is 72, and the oxide consists of

	Atoms.	Equivalents.	Per Cent.
Bismuth	1	72	90
Oxygen	1	8	10
Oxide of Bismuth	1	80	100

When bismuth is dissolved in a mixture of two parts of nitric acid and one of water, the solution yields prismatic crystals of *nitrate of bismuth*, composed of

	Atoms.	Equivalents.	Per Cent.
Oxide of Bismuth	1	80	49·7
Nitric Acid	1	54	33·5
Water	3	27	16·8
Crystallized Nitrate of Bismuth	1	161	100·0

The crystals of nitrate of bismuth are soluble in a small quantity of water, but by large dilution they are resolved into a soluble supernitrate and an insoluble subnitrate, which, when duly edulcorated, forms the *trisnitrate of bismuth* of the Pharmacopœia, for the preparation of which we have the following formula:—

BISMUTHI TRISNITRAS.

℞ Bismuthi, unciam,
Acidi Nitrici, fluidunciam cum semisse,
Aquæ destillatæ, octarios tres;

Aquæ destillatæ fluidunciam acido nitrico misce, et bismuthum in his liqua; tum effunde liquorem. Huic aquæ quod reliquum est adjice, et sepone ut subsidat pulvis. Deinde effuso liquore supernatante bismuthi trisnitratem aquâ destillatâ lava, et leni calore exsicca.

TRISNITRATE of BISMUTH.

Take of Bismuth, an ounce,
Nitric Acid, a fluid ounce and a half,
Distilled Water, three pints;

Mix a fluid ounce of the water with the nitric acid, and in these dissolve the bismuth; then pour off the solution. To this add the remainder of the water, and set aside that the powder may subside. Then, having poured off the supernatant solution, wash the trisnitrate of bismuth with distilled water, and dry it by a gentle heat.

NOTA.

Bismuthi Trisnitras. In acido nitrico sine effervescentiâ tota liquatur. Adjecto acido sulphurico diluto nihil dejicitur.

NOTE.

Trisnitrate of Bismuth. It is entirely dissolved by nitric acid, without effervescence. By the addition of dilute sulphuric acid, nothing is thrown down.

This compound is white, tasteless, and nearly insoluble in water. If it be adulterated with carbonate of lead or of baryta, dilute sulphuric acid renders its nitric solution turbid. It is called a *trisnitrate*, but, according to Grouvelle, it consists of

	Atoms.	Equivalents.	Per Cent.
Oxide of Bismuth	4	320	81·7
Nitric Acid	1	54	13·8
Water	2	18	4·5
Subnitrate of Bismuth	1	392	100·0

According to Mr. Phillips (translation of Pharmacopœia), it is anhydrous, and consists of

One equivalent of Nitric Acid	54	or	18·36
Three equivalents of Oxide of Bismuth	240	,,	81·64
Equivalent	294		100·00

It is the *Spanish white*, *pearl white*, and *magistery of bismuth* of old pharmacy; it blackens by sulphuretted hydrogen, and, unless perfectly free from silver, which is said to be seldom the case, it is discoloured by the action of light. It has been used as a tonic and antispasmodic, especially in dyspepsia attended by pain and spasm. It may be combined with small doses of opium, of hydrochlorate of morphia, of extract of hops, or of henbane. Dr. Paris says, that in pyrosis, and spasmodic gastrodynia associated with acidity and other signs of depraved indigestion, it furnishes the practitioner with a very valuable resource; he prescribes it as follows:—

℞ Bismuthi Subnitratis, gr. viij.
Mucilaginis Acaciæ, fʒij. tere simul; et adde
Mistur. Amygdal. f℥j.
M. fiat haustus.

It is, however, better to begin with a dose of two or three grains, and if it does not nauseate, to increase it to eight or ten grains. An ointment composed of a drachm of subnitrate of bismuth, mixed with six drachms or one ounce of spermaceti cerate, is a good application to irritable and excoriated surfaces.

From the observations of Orfila, it would appear that, in large doses, this substance proves an acrid poison: he repeats the improbable assertion, that the English bakers whiten their bread with it.

Dr. Christison quotes the following case of poisoning by this compound, from the *Bulletin des Sciences Médicales.* A man subject to water-brash took two drachms of the subnitrate, with a little cream of tartar, by mistake for a mixture of chalk and magnesia; he was immediately attacked with burning in the throat, brown vomiting, watery purging, cramps, coldness of the limbs, and intermitting pulse; then with inflammation of the throat, difficult swallowing, dryness of the membrane of the nose, and a constant nauseous metallic taste; on the third day, with hiccup, laborious breathing, and swelling of the hands and face, together with suppression of urine, which was then discovered to have existed from the first. On the fourth day, swelling and tension of the belly were added to the pre-existing symptoms; on the fifth day, salivation; on the sixth, delirium; on the seventh, swelling of the tongue, and enormous enlargement of the belly; and on the ninth he expired. The urine continued suppressed till the eighth day. On inspection of the body, it was found that from the back of the mouth to the rectum there were but few points of the alimentary canal free of disease. The tonsils, uvula, pharynx, and epiglottis, were gangrenous; the larynx spotted black; the gullet livid; the stomach very red, with numerous purple pimples; the whole intestinal canal red, and here and there gangrenous, especially at the rectum. The inner surface of the heart was bright red; the kidneys and brain were healthy.

BISTORTA. *Bistort.* The root of the *Polygonum bistorta. Cl.* 8. *Ord.* 3. Octandria Trigynia. *Nat. Ord.* Polygonaceæ.

This plant is a native of Britain, growing in moist meadows, and flowering in May and September. The root is about the thickness of a finger, perennial, crooked, rugose, firm, of a reddish colour, covered with a brown rind, and furnished with numerous small fibres; the stalk is simple, bending, solid, round, smooth, swelled at the joints, enclosed by the sheaths of the stipulæ, and is a foot and a half or two feet in height; the radical leaves are ovalish, or rather heart-shaped, pointed, and stand upon long winged footstalks; the upper leaves embrace the stem, and are narrower and undulated; the flowers stand upon short footstalks, and terminate the stalk in an oblong close spike; the calyx is small, tubular, and divided into five oval obtuse segments, of a reddish-white colour, and at the base supplied with several nectariferous glands. The bracts are membranous, withered, and each encloses two flowers; the filaments are tapering, white, longer than the calyx, and the anthers are purple; the styles are three, about the length of the stamina; the stigmata are small and round; the ovary is triangular, of a red colour, and the seeds are brown and polished.

The root of bistort is astringent; it is sometimes used in combination with aromatics, in the cure of intermittent fevers, but has fallen much into disuse, and is omitted in the present Pharmacopœia of the London college. In Iceland the root is said to be eaten raw, and also made into a kind of bread.

BITUMEN (from πιτυς, *the pine tree*, whence πιος, *pitch*), *see* Petroleum.

BOLETUS IGNARIUS. *The agaric of the oak.* *Cl.* 24. *Ord.* 13. Cryptogamia Fungi. *Nat. Ord.* Fungaceæ.

This fungus is found upon decayed trunks of oak and ash; the spongy parts are selected for use; they are well beaten, by which they become soft and leathery. Thus prepared, it has been employed as a styptic. When soaked in a solution of nitre, or of nitrate of lead, and dried, it forms a good tinder.

BORAX. *Sodæ Biboras.* Biborate of Soda. (The term *borax* is derived from the Arabic *buruk*, which signifies *brilliant.*)

Nota.	Note.
Borax (crystalli). Aquâ penitùs liquatur. Squamas crystallinas è liquore dejicit acidum sulphuricum. His in alcohole liquatis et accensis, viridi colore flamma ardet.	*Borax (crystals).* It is entirely dissolved by water. Sulphuric acid throws down from the solution crystalline scales. These being dissolved in alcohol, and ignited, the flame burns with a green colour.

This salt is chiefly imported from India in an impure state, under the name of *tincal;* it is purified by gentle calcination, solution, and crystallization. It has also been made by combining soda with native boracic acid, imported from the south of Italy, where it occurs as a volcanic product, and in mineral springs.

Borax forms irregular hexaedral prisms; it has a styptic and alkaline flavour, and is soluble in about 12 parts of water at 60°. When heated, it loses water of crystallization, and swells up into a light porous mass (*calcined borax*), which at a higher temperature fuses into a transparent glass, which soon finds its way through earthen crucibles.

Crystals of *boracic acid* (*see* Boron) are thrown down upon the addition of sulphuric acid to a hot concentrated solution of borax.

There is some difference of opinion as to the equivalent of boracic acid; in the present Pharmacopœia, without any good reason, borax is termed a *biborate;* in the last, it was called a *subborate* of soda; if we assume the equivalent of boracic acid at 68, crystallized borax will consist, according to the analyses of Arfwedson and of Kirwan, of

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	16·85
Boracic Acid	1	68	35·80
Water	10	90	47·35
Crystallized Borate of Soda	1	190	100·00

Borax is a good detergent application in the thrush of children; the *Mel Boracis* of the Pharmacopœia may be conveniently used in these cases, but it generally requires dilution with an equal portion of clarified honey; about an eighth part of tincture of myrrh is a good addition.

The following gargle and mouth-wash is a pleasant application to the throat and gums when under the influence of mercury:—

℞ Boracis Pulver. ʒij.
Aquæ Rosæ, f℥vij.
Mellis Despumat.
Tincturæ Myrrhæ, āā f℥ss. M.

Mel Boracis.	Honey of Borax.
℞ Boracis contritæ, drachmam,	Take of Borax, powdered, one drachm,
Mellis, unciam;	Honey, one ounce;
Misce.	Mix.

BORON. This substance is the base of *boracic acid;* it was discovered by Davy, in 1807, who obtained it by heating boracic acid with potassium, which combines with the oxygen of the acid, and sets the boron free. It is dark olive, infusible, tasteless, and a non-conductor of electricity. Its specific gravity exceeds 2. It is not acted on by water, but when heated in the air, or in oxygen, it burns difficultly into boracic acid; it is more readily oxidized by nitric acid.

Boracic acid was discovered by Homberg, in 1702, and was used in medicine under the name of *sedative salt:* it is usually procured from borax by the action of sulphuric acid, which, by combining with the soda of the salt, liberates the boracic acid; it is nearly tasteless, fuses at a red heat, losing its water of crystallization, and forming, when cold, a hard transparent glass. The anhydrous boracic acid consists of

	Atoms.	Equivalents.	Per Cent.
Boron	1	20	29·41
Oxygen	6	48	70·59
Boracic Acid	1	68	100·00

The crystallized acid contains 6 atoms of water.

BOSWELLIA, *see* Olibanum.

BROMINIUM. *Bromine.* *Brome* (from βρωμος, *a stench.*)

Nota.	Note.
Brominium. Leni calore vaporat, odore acri. In aquâ parùm liquatur, copiosiùs in spiritu rectificato, optimè in æthere. Hujus pondus specificum est 3·0.	*Bromine.* It evaporates by a gentle heat with an acrid odour. It is sparingly dissolved by water, more copiously in rectified spirit, best in ether. Its specific gravity is 3·0.

Bromine was discovered by M. Balard, of Montpelier, in 1826. It is contained in extremely minute proportion, in sea-water, and can only be procured by the evaporation of large quantities, which leave, after the chloride of sodium has been separated, an uncrystallizable residue called *bittern*, in which the bromine is contained. A current of chlorine is passed through this residuary liquor, which gives it an orange tint in consequence of the evolution of bromine; sulphuric ether is then shaken up with it, which abstracts the bromine, acquiring its brownish tint; the ethereal solution is then agitated with solution of potassa, and the ether being distilled off, the remaining solution is evaporated to dryness, and the residue, which is bromide of potassium, is fused. The solution of this bromide of potassium is then decomposed by a current of chlorine, chloride of potassium is formed, and the bromine being volatile, may be distilled off and condensed in a receiver surrounded by ice; or the bromide of potassium may be mixed with pure peroxide of manganese, and then decomposed by sulphuric acid diluted with half its weight of water. The theory of the decomposition of bromide of potassium by manganese and sulphuric acid is precisely similar to the corresponding decomposition of chloride of sodium for the production of chlorine. (*See* Chlorine.)

Bromine is a dark reddish-brown liquid, of a penetrating and peculiar odour and acrid taste. It corrodes organic substances, and tinges them yellow. It is an acrid poison; a single drop put upon the beak of a bird kills it. The specific gravity of bromine is 2·96. According to Balard it does not freeze at 0°. At 4° below 0° Serullas states that it suddenly concretes into a brittle solid. It is extremely volatile, producing a deep reddish-brown vapour in the bottles in which it is preserved. It boils at 115°. Its vapour extinguishes flame. It is little soluble in water, more so in alcohol, and most soluble in ether. It is very sparingly soluble in sulphuric acid, so that that acid, floating upon bromine, may be used to prevent its evaporation. It slowly acts upon olive oil; it destroys the blue of litmus and of indigo. It acts energetically upon many of the metals; tin and antimony burn in its vapour, and it combines with explosive violence with potassium, forming *bromide of potassium*, which is the principal officinal form of bromine hitherto employed. The equivalent of bromine is 78.

Bromide of potassium is most readily procured by adding a solution of pure potassa to bromine, till the colour disappears, evaporating to dryness, and fusing the residue, which may then be redissolved and crystallized; or bromide of zinc may be decomposed by carbonate of potassa, in the same way as the bromide of iron in the following process, which is that of the Pharmacopœia.

POTASSII BROMIDUM.

℞ Brominii, uncias duas,
Potassæ Carbonatis, uncias duas et drachmam,
Ferri ramentorum, unciam,
Aquæ destillatæ, octarios tres;

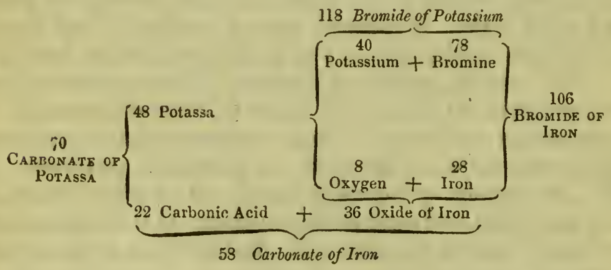
Aquæ destillatæ octario cum semisse adjice principio ferrum et posteà brominium. Sepone per dimidiam horæ partem spathâ subindè agitans. Calorem lenem adhibe, et facto jam colore subviridi potassæ carbonatem reliquâ aquâ liquatam infunde. Cola, et quod restat in aquæ destillatæ ferventis octariis duobus lava, interùmque cola. Consumantur liquores commixti ut fiant crystalli.

BROMIDE OF POTASSIUM.

Take of Bromine, two ounces,
Carbonate of Potassa, two ounces and a drachm,
Iron-filings, an ounce,
Distilled Water, three pints;

To a pint and a half of distilled water add first the iron and afterwards the bromine. Set aside for half an hour, occasionally stirring with a spatula. Apply a gentle heat, and when a greenish colour is obtained, pour in the carbonate of potassa, dissolved in the remainder of the water; filter, and wash what remains with two pints of boiling distilled water, and again filter. Let the mixed solutions be evaporated, that crystals may form.

In this process, the bromine and the iron speedily combine, and yield a solution of *bromide of iron*, which, decomposed by the addition of carbonate of potassa, furnishes a precipitate of carbonate of iron, and *bromide of potassium* remains in solution. The theory of this decomposition, and the atomic equivalents of the acting bodies, are shown in the following diagram, from which it appears that 70 parts of carbonate of potassa, and 106 of bromide of iron, are required for the production of 118 parts of bromide of potassium.



Bromide of potassium is a colourless anhydrous salt, crystallizing in cubes, readily soluble in water, and slightly so in alcohol; it has an acrid bitterish taste, decrepitates when heated, and at a higher temperature fuses. When chlorine is added to its aqueous solution, bromine is evolved, and a brown tint produced, the affinity of chlorine for potassium being greater than that of bromine. It should be purchased in crystals, the characteristic properties of which are stated in the *Notes* of the Pharmacopœia as follows:—

NOTA.	NOTE.
Potassii Bromidum (crystalli). Aquâ totum liquatur. Lacmi et curcumæ colorem non mutat. Ex hoc liquore, barii chloridum nihil demittit. Acido sulphurico et amylo simul adjectis, flavet. Igni impositum, nihil ponderis amittit. Hujus salis gr. 10 argenti nitratis gr. 14·28 permutare valent sic, ut subflavum quid, argenti bromidum, dejiciatur quod ab ammoniâ, minimè autem ab acido nitrico, liquatur.	*Bromide of Potassium (crystals).* It is entirely soluble in water. It does not change the colour of litmus and turmeric. From this solution, chloride of barium throws down nothing. Sulphuric acid and starch being simultaneously added, it becomes yellow. Subjected to heat, it loses no weight. Ten grains of this salt so act upon 14·28 grains of nitrate of silver, that a yellowish bromide of silver is thrown down, which is dissolved by ammonia, but very little by nitric acid.

With respect to these tests of the purity of bromide of potassium, the non-action upon vegetable colours shows the absence of free acid and alkali; the non-action of chloride of barium indicates the absence of sulphates.

If a larger quantity of nitrate of silver than 14·28 grains be required for the decomposition of the salt under examination, the presence of chloride of potassium, or of chloride of sodium, may be suspected; for the equivalent of ten grains of bromide of potassium being 14·4 of nitrate of silver, that of ten grains of chloride of potassium is 22·3, and of ten grains of chloride of sodium, 28·3. The entire solubility in water shows the absence of insoluble adulterations, and when no weight is lost by exposure to heat, no moisture is present. The bromide of potassium, however, prepared according to the present formula, is apt to contain iron, as is also the case with the iodide obtained by a similar process (*see* IODINIUM).

Of the medical powers of bromide of potassium, little is at present known, for it has not been long in use. Dr. Williams, of St. Thomas's Hospital, has used it with great success in cases of enlarged spleen, and Dr. A. T. Thomson has found it of service in improving the secretion of the liver; it has been given as a tonic, stimulant, and deobstruent, in cases analogous to those in which *iodide of potassium* has been employed. The dose is from three to ten grains twice or thrice a day, and it may be administered in solution in common or aromatic water. *Bromide of iron* has been used in the same cases as the iodide of that metal (*see* IODINIUM).

The toxicological history of bromine is as yet imperfect, and it is a very unlikely source of medico-legal inquiry. It appears from the experiments of Dr. Butske (*Christison*, chap. IV.), that free bromine is infinitely more virulent than its compounds. One drop, in half an ounce of water, produced a sense of heat in the mouth, œsophagus, and stomach, and subsequent colic; and two drops and a half in an ounce of mucilage, excited, in addition to the foregoing symptoms, great nausea, hiccup, and increased secretion of mucus. It would appear, therefore, that bromine is an active irritant poison.

Barthey gave half a drachm of bromide of potassium to a dog, which only produced dullness and depression, but no other bad effects. When these and other things are injected into the blood, or when their ejection from the stomach is prevented by a ligature upon the gullet, no satisfactory or useful evidence can be drawn from the results, as applicable to the symptoms or treatment.

BRUCIA. A vegetable alkaloid associated with *Strichnia* (*see* NUX VOMICA).

BUBON. The officinal *galbanum* was formerly stated to be the produce of the *Bubon galbanum.* In the present Pharmacopœia it is referred, upon the authority of Mr. Don, to the *Galbanum Officinale* (*see* GALBANUM).

BUCK BEAN, *see* MENYANTHES.

BUCKTHORN, *see* RHAMNUS.

BUCKOO, or BUCHU, *see* DIOSMA.

BURGUNDY PITCH, *see* ABIETIS RESINA.

CADMIUM. A metal discovered by Stromeyer, in 1817; it is generally associated with zinc. It much resembles tin, but is harder and more tenacious. Its specific gravity is 8·60. It fuses and volatilizes at a temperature below a red-heat. Its equivalent is 56. It has scarcely been employed in medicine, though, from the taste and character of its salts, it may be presumed that their effects would resemble the corresponding compounds of zinc. Dr. Burdash represents it as an irritant poison, in the state of sulphate.

CAFFEIN. A crystallizable principle obtained from coffee. It is bitter, and has been supposed to possess tonic and narcotic qualities.

CAJUPUTI. *Oleum e foliis destillatum.* The oil distilled from the leaves of the *Melaleuca minor.* *Cl.* 13. *Ord.* 3. Polyadelphia Icosandria. *Nat. Ord.* Myrtaceæ.

This is a small tree or shrub, abundant in Amboyna and part of Borneo, whence the essential oil is imported. It has a running root, and stem covered with whitish scaly bark. The leaves are alternate, on short petioles, about three inches long and half an inch broad, lanceolate, and somewhat falcated, fine nerved, of a pale-green colour, and fragrant; the flowers are white, sessile, in long subterminal spikes, and the bracteæ minute and ovate; the calyx is tubular, five-toothed, and half deciduous; the petals roundish and concave; the filaments are fixed within the tube of the calyx, and are long, with small ovate anthers; the ovary is inferior, roundish, crowned with a simple slender style, longer than the filaments, and becomes a three-celled capsule, containing many small oblong angular seeds.

The oil is but sparingly yielded by the distillation of the leaves. It is thin and limpid when newly drawn, and is said to be nearly colourless; but that which is most common in our market is of various shades of green. The colour is sometimes attributed to copper, derived, as it is presumed, from the flasks in which it was brought to Europe; but that imported in glass bottles is generally of the same tint, and none of the samples which I have examined have contained even a trace of copper. I have seen some specimens of genuine oil of a pale brownish yellow tint, and there is reason to believe that the green colour is always artificial, but whence derived I know not. When the oil is rectified by distillation with water, it is obtained nearly colourless, but its other properties are unimpaired. Age also diminishes the depth of its tint.

The fragrancy of genuine cajuputi oil is best perceived when it is rubbed upon the hand; it resembles the mixed odour of camphor, cardamoms, and rosemary. Its specific gravity is about ·980, or, according to some, as low as ·947. Its taste is like that of oil of peppermint mingled with camphor. It is entirely soluble in alcohol. It should not smell or taste of oil of turpentine.

Oil of cajuputi is powerfully stimulant and diaphoretic in doses of from two to six or eight drops; and, in the East, has gained much celebrity in chronic rheumatism, spasmodic cholic, and certain paralytic and nervous affections calling for rapidly-acting and diffusible stimuli. In these cases it is also applied externally as a liniment, either pure or diluted with olive oil. Put into an aching tooth, upon a piece of cotton, it quiets the pain more effectually than most other essential oils. It has been by some highly extolled in the treatment of Asiatic cholera; and during the prevalence of that disease in London, such was the demand for this oil, that its price rose from two to fourteen shillings the ounce.

Dr. Paris says of this oil, “It is a diffusible stimulant of great power, and from the experience I have had for many years of its effects, I might say that its carminative action upon the intestinal canal is of an almost specific nature. It not only stimulates its muscular structure, but imparts a tone which does not follow the use of other aromatics.” The following are among the forms in which he administers it:

℞ Olei Cajuputi, ♏iij.
Sacchari albi, gr. x., tere simul et adde
Infusi Calumbæ, fʒix.
Tinctur. Calumbæ, fʒj.
Fiat haustus.

℞ Olei Cajuputi, ♏iv.
Sacchari albi, gr. x., tere simul et adde
Tincturæ Myrrhæ, fʒj.
Mistur. Camph. fʒx.
Fiat haustus.

CALAMI RADIX, *see* Acorus Calamus.

CALAMINA. *Carbonas Zinci impura. Calamine. Impure Carbonate of Zinc.* Several varieties of ores of zinc are known under the name of *Calamine*, or *Lapis calaminaris;* they consist chiefly of carbonate of zinc, but are generally intimately mixed with variable portions of other ores and stony matter; so that, on account of this uncertainty, it is doubtful whether calamine should be retained in the Materia Medica. The best calamine, as it occurs in commerce, is usually in buff-coloured or reddish-gray fragments, of an earthy aspect. The following are its characters as stated in the *Notes* of the Pharmacopœia.

NOTA.	NOTE.
Calamina. In acido sulphurico ferè tota liquatur bullulas perpaucas acidi carbonici emittens nisi probè ustum fuerit. Hic liquor, adjectâ ammoniâ aut potassâ, demittit id, quod, alterutrâque suprà modum additâ, liquatur.	*Calamine.* It is almost entirely dissolved by sulphuric acid, emitting a very few bubbles of carbonic acid unless it has been well burned. This solution, by the addition of ammonia or potassa, gives a precipitate which is dissolved by either of these added in excess.

These characters may, perhaps, adequately distinguish pure calamine, but that which is found in trade, being always impure, and often scarcely deserving the name of an ore of zinc, cannot be satisfactorily submitted to such tests. Iron, silica, and often copper, are present, together with carbonate of lime, and other impurities, which render the above description nugatory.

The following are the directions for the preparation of calamine.

CALAMINA PRÆPARATA.	PREPARED CALAMINE.
Calaminam ure; tum contere. Deindè fiat pulvis subtilissimus eodem modo, quo cretam preparari præcepimus.	Burn the calamine; then bruise it. Afterwards let it be very finely powdered by the same method as we have directed chalk to be prepared.

Prepared calamine is only used externally, either as a digestive in the form of *Ceratum calaminæ*, or *Turner's cerate*, or in powder, to sprinkle upon ulcerating surfaces; it keeps the sore clean by absorbing the secretion, very rarely irritates, and does not otherwise interfere with the healing process: hence it is often a useful application to venereal sores, keeping them cleanly, and not interfering with the influence of mercury upon their healing process. The *Ceratum calaminæ* is omitted in the present Pharmacopœia, *Unguentum zinci* being probably intended as a substitute; when made of *good* calamine, it is, however, occasionally useful; I accordingly subjoin the old formula.

℞ Calaminæ preparatæ, Ceræ flavæ, singulorum libram dimidiam, Olivæ Olei, octarium;	Take of prepared Calamine, Yellow Wax, of each half a pound, Olive Oil, a pint;
Oleum cum cerâ liquefactâ misce; tum ab igne remove, et, ubi primum lentescant, calaminam adjice, et assidue move, donec refrixerent.	Mix the oil with the melted wax, then remove it from the fire, and when it begins to thicken, add the calamine, and stir assiduously till it is cold.

See the article Zinc, for an account of the other pharmaceutical preparations of this metal.

CALCIUM. The metallic base of *Lime*. When lime is electrized in contact with mercury, an *amalgam* is formed, which decomposes water, and which contains a white and highly inflammable metal; the further properties of *calcium* have not been ascertained, but *lime*, which is an oxide of calcium, consists of

	Atoms.	Equivalents.	Per Cent.
Calcium	1	20	71·4
Oxygen	1	8	28·6
Lime	1	28	100·0

Lime is generally obtained by heating certain limestones, or *carbonates of lime*, such as chalk, marble, &c., to a red heat, exposed at the same time to a current of atmospheric air; under these circumstances, the carbonic acid is expelled, and *caustic lime*, or *quicklime*, is obtained. When lime is required to be perfectly pure, white marble may be dissolved in pure and diluted hydrochloric acid; from this solution, carbonate of ammonia throws down carbonate of lime, which is to be washed upon a filter, with repeated portions of hot distilled water, and exposed for a sufficient time to a bright red heat, in an open platinum crucible. Pure lime is white, acrid, caustic, and alkaline; its specific gravity = 2·3. It is very difficult of fusion, but promotes the fusion of many other earths and oxides, so that it is a powerful flux. When duly heated in an oxyhydrogen flame, it is intensely luminous. Exposed to air, it absorbs water, and some carbonic acid. When sprinkled with water, there is a great evolution of heat, and a bulky white powder is obtained, which is a *hydrate of lime*, or *slaked lime*, consisting of

	Atoms.	Equivalents.	Per Cent.
Lime	1	28	75·6
Water	1	9	24·4
Hydrate of Lime	1	37	100·0

The following is the *Note* of the Pharmacopœia referring to lime and its hydrate:—

Nota.	Note.
Calcis Hydras. Acido hydrochlorico diluto sine effervescentiâ liquatur. Hic liquor, ammoniâ adjectâ, nihil demittit.	*Hydrate of Lime.* It is dissolved, without effervescence, by dilute hydrochloric acid. This solution, on the addition of ammonia, affords no precipitate.
Calx, aquâ adjectâ resoluta in pulverem fatiscit. Cætera ut in præcedente.	*Lime,* water being added, cracks and falls to powder. In other respects it resembles the preceding.

The want of effervescence with diluted acid shows that the whole of the carbonic acid has been expelled; and the absence of oxide of iron, alumina, and silica, is indicated by the transparency of the hydrochloric solution after caustic ammonia has been added. The following are the *Preparations of Calcium* (Præparata è Calcio) directed in the present Pharmacopœia:—

CALX.	LIME.
℞ Cretæ, libram ; In frustula contunde, et igne acerrimo combure per horam.	Take of Chalk, a pound ; Pound it into fragments, and burn it in a very strong fire for an hour.
LIQUOR CALCIS.	**SOLUTION OF LIME.**
℞ Calcis, selibram, Aquæ destillatæ, octarios duodecim; Calci aquæ pauxillo priùs resolutæ reliquam aquam effunde, et simul agita ; tum protinùs vas contege, et sepone per horas tres ; dein liquorem cum calce superstite in vasis vitreis obturatis serva, et, ubi utendum est, ex limpido liquore sume.	Take of Lime, half a pound, Distilled Water, twelve pints ; On the lime, first slaked with a little of the water, pour the remaining water, and agitate them together ; then immediately cover the vessel, and set it by for three hours ; afterwards keep the solution, with the remaining lime, in stopped glass vessels, and when it is to be used, take from the clear solution.

This is the *Aqua Calcis*, or *Lime Water*, of former Pharmacopœiæ. According to Mr. Phillips, a pint of water at the temperature of 60° dissolves 11·6 grains of lime; whereas, at 32° the same quantity of water dissolves 13·25 grains, and at 212° only 6·7, so that, unlike most other substances, the solubility of lime increases as the temperature of the water decreases, water at 32° taking up nearly one-seventh more lime than water at 60°, and nearly double the quantity that is dissolved by boiling water; the consequence is, that lime water becomes turbid when boiled, in consequence of the separation of a portion of the lime which, at the lower temperature, was retained in permanent solution.

Lime water is limpid, colourless, and has an acrid alkaline taste; when exposed to the air, a pellicle of carbonate of lime gradually forms upon its surface, which, when broken, is succeeded by others, till the whole of the lime is separated in the form of carbonate; hence the necessity of preserving lime water in well-stopped bottles, and hence, also, its value as a test of the presence of carbonic acid, and as an agent in the decomposition of the alkaline carbonates.

The medical uses of lime water are very limited; it is of course antacid, and therefore relieves those forms of dyspepsia attended by excessive acidity in the secretions of the stomach, but the dose required is large, and the remedy nauseous and inconvenient.

In calculous affections large quantities of lime water have been occasionally prescribed, but in such cases it is an injudicious form of alkali. The other disorders in which lime water has found advocates are diarrhœa, worms, leucorrhœa, and diabetes. The dose is from one to five or six ounces, and it has usually been given with milk. As an external remedy, it has been applied to foul ulcers, and to some cutaneous eruptions, but always with doubtful success.

CRETA PRÆPARATA.

℞ Cretæ, libram,
Aquæ, quantum satìs sit;

Cretæ adjice aquæ paululum, et tere, ut fiat pulvis subtilis. Hunc in vas amplum cum aquæ reliquâ conjice; tum agita, et, brevi morâ interpositâ, in vas aliud aquam adhuc turbidam supernatantem transmitte, et sepone, ut subsidat pulvis; denique effusâ aquâ, pulverem hunc exsicca, et in usum serva.

Eodem modo testæ sordibus priùs purgatæ et aquâ fervente lotæ præparantur.

PREPARED CHALK.

Take of Chalk, a pound,
Water, as much as may be sufficient;

Add the water by degrees to the chalk, and rub, that it may become fine powder. Put this into a large vessel with the rest of the water, then agitate, and after a short interval pour the supernatant turbid water into another vessel, and set it aside, that the powder may subside; lastly, the water being poured off, dry this powder, and keep it for use.

In the same way, shells previously cleansed of impurities, and washed with boiling water, are prepared.

These directions are intended to convey a description of the process of *elutriation* and *levigation*, by which insoluble substances are reduced to an impalpable powder.

Chalk, when pure, is a *carbonate of lime*, and, from its abundance and soft texture, it is a valuable form of that substance, applicable to a variety of useful purposes. It consists of

	Atoms.	Equivalents.	Per Cent.
Lime	1	28	56
Carbonic Acid	1	22	44
Carbonate of Lime	1	50	100

Carbonate of lime is tasteless, and entirely soluble, with effervescence, in dilute nitric, and hydrochloric acid; these solutions are colourless, they afford no precipitate with pure ammonia, but carbonate of ammonia throws down carbonate of lime. Exposed for a sufficient time to a red heat and a current of air, the carbonic acid is expelled from carbonate of lime, and 44 *per cent.* of quicklime remains: but in close vessels, air and moisture being excluded, the carbonic acid cannot be thus driven off. Calcareous spar, white granular marble, and white chalk, are the purest natural forms of carbonate of lime.

In medicine, prepared chalk is a useful antacid; and in common diarrhœa, after the bowels have been evacuated by a rhubarb purge, chalk-mixture with aromatic astringents, and, if necessary, small doses of opium, is useful in quieting the bowels. The following are the cretaceous preparations of the Pharmacopœia:—

MISTURA CRETÆ.

℞ Cretæ preparatæ, unciam dimidiam,
Sacchari, drachmas tres,
Misturæ Acaciæ, fluidunciam cum semisse,
Aquæ Cinnamomi, fluiduncias octodecim;
Misce.

MIXTURE OF CHALK.

Take of prepared Chalk, half an ounce,
Sugar, three drachms,
Mixture of Acacia, a fluid ounce and a half,
Cinnamon Water, eighteen fluid ounces;
Mix.

PULVIS CRETÆ COMPOSITUS.	COMPOUND POWDER OF CHALK.
℞ Cretæ præparatæ, libram dimidiam,	Take of prepared Chalk, half a pound;
Cinnamomi, uncias quatuor,	Cinnamon, four ounces,
Tormentillæ,	Tormentilla,
Acaciæ, singulorum uncias tres,	Acacia, of each three ounces;
Piperis longi, unciam dimidiam;	Long Pepper, half an ounce;
Separatim in pulverem subtilissimum tere; dein misce.	Separately powder these finely; then mix.

PULVIS CRETÆ COMPOSITUS CUM OPIO.	COMPOUND POWDER OF CHALK WITH OPIUM.
℞ Pulveris Cretæ compositi, uncias sex cum semisse,	Take of Compound Powder of Chalk, six ounces and a half,
Opii duri contriti, scrupulos quatuor;	Powdered Opium, four scruples;
Misce.	Mix.

The chalk mixture may be prescribed in diarrhœa, as follows:—

℞ Misturæ Cretæ, f℥v.
Tincturæ Cinnamomi, fʒvj.
Tincturæ Catechu, fʒij.
Misce. Cochlearia tria pro dosi quartâ quaque hora.

℞ Confectionis Aromaticæ, ʒij.
Misturæ Cretæ, f℥v.
Spiritus Cinnamomi, f℥j.
Tincturæ Opii, fʒss.
M. Sumantur cochlearia tria ampla post singulas sedes liquidas.

The *Compound Powder of Chalk* is well adapted for checking atonic diarrhœa; that *with opium* contains one grain of opium in two scruples of the powder: the dose of either is from five to thirty grains; and where opium, conjoined with aromatics, is required, the latter furnishes a convenient form for its subdivision. These powders are best administered as follows:—

℞ Pulv. Cretæ compos. ʒss.
Misturæ Acaciæ, fʒiij.
Aquæ Cinnamomi, fʒvij.
M. fiat haustus.

CHLORIDE OF CALCIUM. This compound occurs in sea water, and in some mineral waters. The following are the directions for its preparation:

CALCII CHLORIDUM.	CHLORIDE OF CALCIUM.
℞ Cretæ, uncias quinque,	Take of Chalk, five ounces,
Acidi Hydrochlorici,	Hydrochloric Acid,
Aquæ destillatæ, singulorum octarium dimidium;	Distilled Water, of each half a pint;
Acidum aquâ misce; hisque gradatim adjice cretam usque ad saturationem. Tum peractâ effervescentiâ cola; liquorem consume donec sal exsiccetur. Hunc in crucibulum injice et ad ignem liquefactum super lapidem planum et	Mix the acid with the water, and to these gradually add the chalk up to saturation. Then the effervescence being over, filter; evaporate the solution till the salt is dry; put it into a crucible, and having fused it by fire, pour it out

nitidum effunde. Denique ubi refrixerit in frustula contunde, et in vase benè obturato serva.

upon a smooth and clean stone. Lastly, when it is cold, break it into pieces, and keep it in a well-stopped vessel.

LIQUOR CALCII CHLORIDI.

℞ Calcii Chloridi, uncias quatuor,
Aquæ destillatæ, fluiduncias duodecim;
Calcii chloridum liqua, et cola.

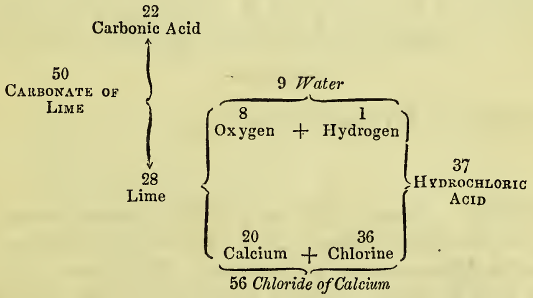
SOLUTION OF CHLORIDE OF CALCIUM.

Take of Chloride of Calcium, four ounces,
Distilled Water, twelve fluid ounces;
Dissolve the chloride of calcium, and filter.

Chloride of calcium, after having been fused as above directed, is a hard gray substance, extremely deliquescent and soluble in water, and in alcohol. It has a bitter acrid taste, and consists of

	Atoms.	Equivalents.	Per Cent.
Calcium	1 . .	20 . .	25·7
Chlorine	1 . .	36 . .	64·3
Chloride of Calcium	1 . .	56 . .	100·0

In the above process the carbonate of lime is decomposed by the action of the hydrochloric acid, and the carbonic acid being expelled, the mutual decomposition of the hydrochloric acid and the lime give rise to water and chloride of calcium, as shown in the following diagram, to which the equivalents are affixed, that of the hydrochloric acid signifying the weight of real or dry acid in the required quantity of the common liquid acid.



Chloride of calcium has been used in scrophulous and glandular disorders, as a deobstruent tonic, and generally regarded as more efficacious and less irritating than chloride of barium; Hufeland, however, represents it as the more powerful remedy of the two. The dose is from twenty minims to a drachm of the above *solution*, in milk, or in water sweetened with a little syrup.

CALX CHLORINATA.

℞ Calcis Hydratis, libram,
Chlorinii, quantum satis sit;
Calci in vase idoneo sparsæ chlorinium immitte donec saturetur.

Chlorinium facillimè elicitur ex manganesii binoxydo, acido hydrochlorico adjecto, leni calore.

CHLORINATED LIME.

Take of Hydrate of Lime, a pound,
Chlorine, as much as may suffice;
Send in the chlorine to the lime in a proper vessel, till it is saturated.

Chlorine is very easily evolved from binoxide of manganese, mixed with muriatic acid, by a gentle heat.

Chloride of lime (under the name of *bleaching powder*), is so abundantly and well prepared by the wholesale manufacturer, that it might have safely been placed among the articles of the Materia Medica. There are differences of opinion respecting the composition of this product. Berzelius and Balard regard it as a chlorite or hypochlorite of lime; but if chlorous acid were formed, lime must have been decomposed, and chloride of calcium produced, none of which is found; there can, therefore, be little doubt that the above compound consists of lime, water, and chlorine; when well prepared, it contains

	Atoms.	Equivalents.	Per Cent.
Hydrate of Lime	2	74	69
Chlorine	1	36	31
Chloride of Lime	1	110	100

Chloride of lime is nearly colourless; it smells slightly of chlorine, and has a pungent taste. It is partially soluble in water, and the solution is termed *bleaching liquid.* Exposed to air it slowly evolves chlorine, and absorbs carbonic acid; ultimately a little chloride of calcium is formed, and it deliquesces. When heated, oxygen is evolved, and chloride of calcium is formed.

Chloride of lime is a valuable disinfectant; when exposed to the air, either dry, or in solution, it slowly evolves chlorine, which destroys the odour of putrefying animal matter, and decomposes infectious effluvia. Acted upon by dilute acids, chlorine is evolved with effervescence.

In reference to the production of chlorine by the mutual action of black oxide of manganese and hydrochloric acid, *see* Chlorine.

CALOMEL, *see* Hydrargyrum.

CALUMBA. *Radix.* The root of the *Cocculus palmatus. Cl.* 22. *Ord.* 10. Diœcia Dodecandria. *Nat. Ord.* Menispermaceæ.

This is the *Menispermum palmatum* of Willdenow; it is a native of the eastern part of Africa, growing abundantly in the forests of Mozambique, where the natives carry on a considerable trade in it. The roots are dug up in the month of March, and transported to Tranquebar, where it is an article of export with the Portuguese. It is not grown, as was once supposed, at Colombo, the capital of Ceylon. In 1805, a male plant was raised by Dr. Anderson, at Madras, from a root brought by M. Fortin; in 1825, the male and female plants were obtained by Captain Owen from Oibo, and carried to the Mauritius and Bombay; the following character of the male plant has been given by Dr. Berry, and adopted by De Candolle (*Asiatic Researches*, x., 385, t. 5).

The root is perennial, ramose, and bears fusiform tubers. The stems are annual, withering at the end of seven months; voluble, simple, round, hairy, about the thickness of a goosequill, bearing distant, alternate, five-lobed, five-nerved leaves, with entire acuminate lobes, and supported on round, hairy petioles, shorter than the leaves. The male flowers are in axillary solitary compound racemes, hairy, and shorter than the leaves, bearing partial alternate peduncles, with sessile flowers; and lanceolate, ciliated, deciduous bractes. The calyx is hexaphyllous, with three exterior leaflets and three interior, equal, oblong, obtuse, and glabrous. The corolla consists of six minute, oblong, wedge-shaped, concave, fleshy, obtuse petals. The stamens are six, a little longer than the corolla; the anthers four-lobed, and four-celled; there is no pistillum. The roots are collected in March, but the offsets only are taken, each offset being a sessile tuber. In the female plant the racemes are solitary, axillary, spreading, and shorter than those of the male; the calyx and petals resemble those of the male. The pistils are three, free, of which two are abortive; they are ovate, acuminate, glanduloso-pilose, and contain one ovule; the style is short; the stigmas spreading; the fruit drupaceous; the seed subreniform, black, striated. (*Thomson's L. D.* ART. *Cocculus.*)

Calumba root is imported into Europe in bags and cases. It is usually dried in slices, having a thick yellow bark, covered with an olive-coloured cuticle, and surrounding a browner and spongy central portion. The slices are generally mixed with longer pieces of the root, especially in samples which are not very select. It is almost always worm-eaten, but it should be selected as little so as possible, dense, and of a bright colour. It has a strong, bitter, and slightly pungent taste; and its aqueous infusion holds a considerable portion of starch and mucilage, and is very prone to decomposition in a warm atmosphere: it yields a copious blue precipitate with iodine. Calumba is said sometimes to be mixed with slices of briony root, which have been infused in quassia water and tinged with saffron.

From 100 parts of calumba root Planche obtained

Yellow extractive matter	13
Starch	33
Mucilage	9
Animo-vegetable matter	6
Woody fibre	39
Trace of volatile oil	—
	100

Geiger observes that calumba deserves more accurate examination, as, according to Buchner, it appears to possess properties derived from the presence of menispermia (picrotoxia). More lately, however, Wittstock, of Berlin, has obtained from it a crystallizable principle, which he calls *Calumbin*, and to which its medicinal activity is probably due; he digests calumba in alcohol sp. gr. 835, and reduces the tincture, by distillation, to one-third, when crystals form in the residue: these, when purified, are very bitter, scarcely soluble either in water or in cold alcohol, not alkaline, and soluble in dilute acids and in alkalis. (*Journ. de Pharmacie*, Fevrier, 1831.)

The following are the officinal preparations of this root:—

INFUSUM CALUMBÆ.	INFUSION OF CALUMBA.
℞ Calumbæ concisæ, drachmas quinque,	Take of Calumba, sliced, five drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours in a lightly covered vessel, and strain.

TINCTURA CALUMBÆ.	TINCTURE OF CALUMBA.
℞ Calumbæ concisæ, uncias tres,	Take of Calumba, sliced, three ounces,
Spiritus tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

The *infusion* should always be used freshly prepared, as it becomes ropy and putrescent after it has been kept for a few days in a warm room: the dose is from one to two ounces. The *tincture* is in general turbid; it should be made with rectified spirit, which would effectively dissolve the active principle of the root, without acting upon the starch and mucilage: the dose is from half a drachm to two drachms.

Of the *powdered root* from five to twenty grains may be taken three times a day, and it may be conveniently formed into pills with a few drops of water only. Ten grains twice a day has been found efficaceous in nervous headache.

Calumba is not only a very good simple bitter, but is generally more agreeable to delicate stomachs than other medicines of this class, especially in the form of infusion, conjoined, if necessary, with aromatics, in dyspepsia, in diarrhœa, and in the after-treatment of cholera morbus. Alkalis, acids, and saline aperients may also be administered with it. The following is a good formula where flatulency and heartburn are attending on a slightly gouty habit, with a red deposit in the urine:

℞ Infus. Calumbæ, f℥v.
Tincturæ Calumbæ, f℥j.
Ammoniæ Sesquicarbon. ʒss.
M. Fiat mistura; sumantur cochl. iij. ampla mane et meridie.

In lithic diathesis, Dr. Paris prescribes as follows:

℞ Magnesiæ Carb. ℈j.
Infus. Calumbæ, f℥j.
Tinct. Calumbæ, fʒj.
Fiat haustus.

As calumba is not blackened by preparations of iron, it is properly prescribed where it is desirable to administer them in conjunction with bitters.

℞ Infusi Calumbæ, fʒxj.
Tincturæ Ferri Sesquichloridi, ♏x.
Tincturæ Calumbæ, fʒj.
Fiat haustus bis die sumendus.

From a teaspoonful to a tablespoonful of the following mixture may be given, according to their age, to children who are troubled with diarrhœa occasioning debility during dentition; but care should be taken not to check such laxity of the bowels suddenly or unnecessarily, as it is often the comparatively harmless substitute of the more formidable evils that attend teething.

℞ Carui contus.
Calumbæ contus.
Rhæi contus. āā ℈j.
Aquæ ferventis, f℥viij.
Macera per horas duas et cola.

℞ Liquoris Colati, f℥iijss.
Tinctur. Rhæi, fʒj.
Syrup. Aurant. fʒij. M.

Or the following, as a tonic, in analogous cases:

℞ Infus. Calumbæ,
Aquæ Anethi, āā fʒvj.
Spiritûs Ammoniæ compos. ♏xx.
Fiat mistura de quâ detur cochleare unum minimum tertiâ quâque horâ.

Dr. Thomson recommends infusion of calumba for restraining the nausea and vomiting which attend pregnancy.

CALX. *Lime.* *See* Calcium.

CAMBOGIA. *Gummi Resina.* The gum-resin of the *Hebradendron Cambogioides. Cl.* 22. *Ord.* 1. Polygamia Monœcia. *Nat. Ord.* Guttaceæ.

The term *gamboge* is derived from *Kamboia*, a river in Siam, in the vicinity of which the gum is said to be abundantly obtained; the tree is stated to be a native of the kingdom of Siam, and of Ceylon. A figure and description of it will be found in the *Companion to the Botanical Magazine*, vol. ii., p. 193. Gamboge is obtained by breaking the leaves and shoots, and by wounding the bark, when it oozes in the form of a viscid yellow sap, concreting in drops or tears, whence the name *gummi guttæ;* it is, however, commonly collected in cocoa-nut shells, and jars, and when to a certain degree indurated, is rolled into cakes or sticks, and wrapped in flag leaves, or sometimes cast in the joints of a bamboo. It comes to Europe in boxes, and is largely used as a water-colour, and an ingredient in some lacquers and varnishes. When broken, its fracture should be clean and conchoidal, and of a deep orange colour, rendered bright yellow when rubbed with a drop or two of water. It has little smell or taste, is opaque, brittle, and yields a yellow powder. When heated it fuses and burns with a white flame. Its specific gravity is 1·22.

According to John, 100 parts of gamboge contain

Yellow resin	89·0
Gum	10·5
Impurities	0·5
	100

It yields on incineration traces of carbonate, phosphate, and muriate of potassa, and carbonate and phosphate of lime.

The following is the only officinal formula in which gamboge is used:

Pilulæ Cambogiæ Compositæ.	Compound Pills of Gamboge.
℞ Cambogiæ contritæ, drachmam,	Take of Gamboge, in powder, a drachm,
Aloës contritæ, drachmam cum semisse,	Aloes, in powder, a drachm and a half,
Zingiberis contritæ, drachmam dimidiam,	Ginger, in powder, half a drachm,
Saponis, drachmas duas;	Soap, two drachms;
Misce inter se pulveres; dein, adjecto sapone, omnia simul contunde, donec corpus unum sit.	Mix the powders with each other; then, having added the soap, pound all together till incorporated.

Gamboge was first introduced into the Materia Medica by Clusius, in 1603, as a purgative and hydragogue. It ranks among the drastic purges; but as it is apt to excite nausea and vomiting, and to gripe excessively, it is rarely used, except in very small doses along with other cathartics. It is said to form an ingredient in many of the empirical compositions sold for the cure of tape-worm, in which, indeed, combined with calomel, it is very effectual, but less certain and more drastic than a large dose of oil of turpentine.

From four to six grains of gamboge is usually a very operative dose, but the addition of a grain to other purgatives is often useful in sharpening their activity; and one or two grains rubbed up with sugar have been recommended in consequence of its tastelessness, as a purge for infants; but to them it should be given with much circumspection. A solution of gamboge in carbonate of potassa is said to be purgative and diuretic, and, as such, has been recommended in dropsical affections.

The *Pilulæ Cambogiæ compositæ* are sometimes prescribed in cases of obstinate constipation, in doses of ten or fifteen grains.

The combination of the readily soluble gamboge with the less soluble aloes is by some supposed to render the former more slow and mild in its action: be this as it may, these pills are effectively and often drastically purgative. They are occasionally conjoined with other cathartics, with calomel, for instance, and with compound extract of colocynth, but gamboge is rarely prescribed except as a hydragogue in ascites and anasarca.

CAMPHORA (Kanfur of the Arabians). *Concretum sui generis, sublimatione purificatum.* A peculiar concrete substance, purified by sublimation. It is the produce of the *Laurus Camphora. Cl.* 9. *Ord.* 1. Enneandria Monogynia. *Nat. Ord.* Lauraceæ.

The camphor laurel is a native of Japan and China; it is a large branching tree, with a smooth bark: the leaves stand on long footstalks; they are lanceolate, entire, smooth, and ribbed: pale-green upon the upper, and glaucous on the lower surface. The flowers are small, white, pedicellated, terminating the common peduncles, which are long, naked, erect, and proceed from the axils of the leaves: there is no corolla: the calyx consists of six small, ovate, concave, unequal sepals, inclosing some fleshy glands surrounding the ovary: the filaments are shorter than the calyx; anthers round: ovary roundish: style simple, the length of the filaments; stigma obtuse.

Camphor is also found in several other plants, and some of the camphor brought to Europe is the produce of the *Dryobalanops aromatica*, a tree common in Sumatra and Borneo. When purified by sublimation, we find it in commerce in cakes weighing about eight pounds each, sonorous when struck, white, translucent, and somewhat tough in consistency, but admitting of reduction to powder by the aid of a few drops of spirit of wine. Its odour is strong and agreeable to most persons; its taste cooling, and at the same time aromatic and pungent. Its specific gravity is 0·988. It fuses at about 300°.

It is very sparingly soluble in water, but copiously in alcohol, in oils, and in several acids. The alkalis scarcely act upon it. The specific gravity of the vapour of camphor is 5·29. Camphor has been shown by Dumas to be an oxide of an hydrocarbon identical in composition with pure oil of turpentine; hence the term *camphogen*, or *camphene*, applied to that oil. Camphogen is composed of

	Atoms.	Equivalents.	Per Cent.
Carbon	10	60	88·1
Hydrogen	8	8	11·9
Camphogen	1	68	100·0

And the ultimate elements of camphor are

	Atoms.	Equivalents.	Per Cent.
Carbon	10	60	79·0
Hydrogen	8	8	10·5
Oxygen	1	8	10·5
Camphor	1	76	100·0

When nitric acid is repeatedly distilled off camphor, it converts it into *camphoric acid*, which is a compound of one atom of camphor and four atoms of oxygen. Dr. A. T. Thomson states that he has formed camphor by passing a stream of oxygen gas through highly rectified oil of turpentine. It will be remarked that the leading characters of camphor are those of a concrete volatile oil.

The sparing solubility of camphor in water has led to the formula in the Pharmacopœiæ called *Camphor julep*, or *mixture;* and another useful pharmaceutical form of camphor is *Camphorated Spirit*, or, as it is not quite correctly termed in the present Pharmacopœia, *Tincture of Camphor.*

MISTURA CAMPHORÆ.	MIXTURE OF CAMPHOR.
℞ Camphoræ, drachmam dimidiam,	Take of Camphor, half a drachm,
Spiritûs rectificati, minima decem,	Rectified Spirit, ten minims,
Aquæ, octarium;	Water, a pint;
Camphoram primùm cum spiritu tere, deindè cum aquâ paulatim instillatâ, et per linteum cola.	First rub the camphor with the spirit, then with the water gradually added, and strain through linen.

TINCTURA CAMPHORÆ.	TINCTURE OF CAMPHOR.
℞ Camphoræ, uncias quinque,	Take of Camphor, five ounces,
Spiritus rectificati, octarios duos:	Rectified Spirit, two pints;
Misce, ut liquetur camphora.	Mix, that the camphor may be dissolved.

In the *Mistura Camphoræ*, a very small quantity of camphor is held in permanent solution, yet, when it is properly filtered, it is not an inelegant preparation as a vehicle for antispasmodics, where the virtue of camphor is not immediately required. A camphor mixture or julep, preferable to the above, may be made with less trouble by mixing half a fluid ounce of camphorated spirit with an equal quantity of rectified spirit, and adding the mixture at once to half a gallon of water, with which it must be thoroughly shaken.

Considerable difference of opinion exists as to the medical virtues of camphor; by some it is undeservedly condemned as inefficacious, and by others its powers are overrated. In small doses it acts as a sedative and diaphoretic, these effects being preceded by slight exhilaration; in doses, for instance, of from one to three grains; and persons who cannot procure rest except from large doses of opium will sometimes succeed by combining smaller doses with camphor. It produces little effect upon the pulse, except in large doses, when it softens it and renders it fuller. It is a useful adjunct to bark in typhoid diseases; to valerian, the fetid gums, volatile alkali, and ethereals, in hysteric and nervous complaints; and to antimonials, and other diaphoretics, in rheumatism and certain inflammatory disorders. The following formula may be used for the independent exhibition of camphor:—

℞ Camphoræ gr. iij. (ope alcoholis, in pulverem tritæ)
Acaciæ pulv. ʒss. tere simul et adde,
Misturæ Amygdalæ f℥iss.
M. fiat haustus.

The following are Dr. Hooper's prescriptions for *Mistura Camphoræ fortior*. They are good forms for the exhibition of camphor.

℞ Camphoræ, gr. xxv.
Amygdalas dulces decorticatas, vj.
Sacchari purificati, ʒiij.
Optime contere, dein adde gradatim
Aquæ Menthæ viridis, f℥vijss. ut fiat mistura; sit dosis cochlearia tria magna.

℞ Camphoræ, gr. xxv.
Spiritûs rectificati, ♏v.
Fiat terendo pulvis; dein adde
Pulveris Acaciæ, ʒiv.
Syrupi Limonum, f℥ss.
Aquæ Menthæ viridis, f℥vij. ut fiat emulsio; sit dosis cochlearia tria magna.

In certain cases of febrile action, where the object is to allay irritation, promote perspiration, and induce sleep, either of the above mixtures may be employed. About five grains of camphor every four hours may be considered as a full dose, and as likely to produce all the advantages to be derived from the remedy; it has been given in doses of from twenty to thirty grains, and is then apt to produce vomiting, giddiness, and other deleterious effects.

TINCTURA CAMPHORÆ COMPOSITA.	COMPOUND TINCTURE OF CAMPHOR.
℞ Camphoræ, scrupulos duos cum semisse,	Take of Camphor, two scruples and a half,
Opii duri contriti,	Opium in powder,
Acidi Benzoici, singulorum grana septuaginta duo,	Benzoic Acid, of each seventy-two grains,
Anisi Olei, fluidrachmam,	Oil of Anise, a fluid drachm,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

This is the *Paregoric Elixir* of old pharmacy, a favourite remedy in chronic asthma and some obstinate coughs, which are not rendered worse by moderate stimulants. As about a grain of opium is contained in each *half fluid ounce*, the dose must be adjusted accordingly; one or two drachms are commonly given in a wine glassful of warm water. In cases of chronic bronchitis, after the inflammatory symptoms have subsided, the following will sometimes allay the cough:

℞ Tincturæ Camphoræ compos. fʒss.
Syrupi Croci, fʒij.
Misturæ Amygdalæ, f℥iijss.
M. Capiantur cochlear. duo ampla subinde.

Paregoric elixir, though a common, is not always a harmless remedy; it is often found in the nursery, especially for the cure of whooping-cough, but no preparation containing even the smallest quantity of opium should ever be given to infants; nor even to young children, without the most urgent necessity.

Camphor is a valuable external stimulant, and as such, is often employed in rheumatic and other painful affections of the muscles and joints. Its solutions in oil and in spirit, and the *Linimentum Camphoræ compositum*, are good formulæ for these purposes. Twenty or thirty grains of powdered camphor added to a common poultice will sometimes relieve obstinate rheumatic affections of tendinous parts; and applied to the perinæum, it is effectual in diminishing irritation in gonorrhœa and allaying chordee.

The following are the officinal formulæ for the external application of camphor:—

LINIMENTUM CAMPHORÆ.	LINIMENT OF CAMPHOR.
℞ Camphoræ, unciam,	Take of Camphor, an ounce,
Olivæ Olei, fluiduncias quatuor;	Olive Oil, four fluid ounces;
Liqua camphoram in oleo.	Dissolve the camphor in the oil.

This and similar oleaginous solutions of camphor are often effectual in the relief of chronic rheumatism, when diligently rubbed in upon the affected part; they also occasionally lead to the dispersion of glandular tumours; the camphor not only acts as a stimulant upon the absorbents, but much of the benefit is referrible to the friction. The above liniment is sometimes substituted with advantage for the pure olive oil in the *Linimentum Ammoniæ fortius*.

LINIMENTUM CAMPHORÆ COMPOSITUM.	COMPOUND LINIMENT OF CAMPHOR.
℞ Camphoræ, uncias duas cum semisse,	Take of Camphor, two ounces and a half,
Liquoris Ammoniæ, fluiduncias septem cum semisse,	Solution of Ammonia, seven fluid ounces and a half,
Spiritûs Lavandulæ, octarium;	Spirit of Lavender, a pint;
Liquorem ammoniæ spiritu misce; tum ex retortâ vitreâ, lento igne, destillet octarius; denique in hoc liqua camphoram.	Mix the solution of ammonia with the spirit; then, from a glass retort, by a gentle fire, let a pint distil; lastly, in this dissolve the camphor.

This process, though somewhat circuitous, affords an elegant and useful liniment, applicable in the same cases as the liniments of ammonia generally, but having the advantage of not being greasy; it may be applied by friction or sprinkled upon flannel. Like other stimulating liniments, it sometimes induces erysipelatous inflammation.

LINIMENTUM SAPONIS.	LINIMENT OF SOAP.
℞ Saponis, uncias tres,	Take of Soap, three ounces,
Camphoræ, unciam,	Camphor, an ounce,
Spiritûs Rosmarini, fluiduncias sedecim ;	Spirit of Rosemary, sixteeen fluid ounces ;
Liqua camphoram in spiritu; dein saponem adjice, et macera leni calore, donec liquetur.	Dissolve the camphor in the spirit, then add the soap, and digest in a gentle heat till it is dissolved.

This, which resembles the *Opodeldoc* of Paracelsus, is an excellent liniment in rheumatic affections and local pains: the soap is itself a stimulant, and prevents rapid drying upon the part; the camphor and spirit stimulate, and the oil of rosemary gives it a pleasant odour. It is a good addition to other liniments; mixed with tincture of cantharides it is rendered more effectively stimulant and rubefacient; and with the addition of tincture of opium it forms one of the best sedative liniments.

In paralytic and chronic rheumatic cases, the following may be prescribed as a stimulating liniment:—

℞ Tincturæ Cantharidis,
Linimenti Saponis, āā f℥j.
Fiat linimentum.

Or,—

℞ Linimenti Camphoræ compositi,
Linimenti Saponis,
Olei Cajuputi, āā f℥j.
Fiat linimentum stimulans.

The following are the usually prescribed sedative liniments:—

℞ Tincturæ Opii, f℥j.
Tinctur. Camphoræ, f℥ij.
Fiat linimentum anodynum.

℞ Tincturæ Opii, f℥j.
Linimenti Saponis, f℥iij.
M. ft. linimentum opiatum.

CANCER. The *Crab. Chelæ Cancrorum.* The *claws* of the *Cancer pagurus*, or black-clawed crab. *Lapilli* or *oculi cancrorum :* the concretions found in the stomach of the *Cancer astacus*, or crawfish, commonly called *crab's eyes.*

Mr. Hatchett found the crustaceous coverings of crabs and lobsters to consist of about 63 *per cent.* of carbonate of lime, 6 of phosphate of lime, with a little chloride of sodium and phosphate of magnesia, and 28 to 29 per cent. of animal matter, having the characters of indurated albumen. The crab's eyes are similarly composed; and both these articles, when prepared by levigation, were formerly used as antacids and absorbents; they are now properly rejected, and prepared chalk is used as their substitute.

CANELLA. *Cortex.* The bark of the *Canella alba.* *Cl.* 11. *Ord.* 1. Dodecandria Monogynia. *Nat. Ord.* Meliaceæ.

The white, or laurel-leaved canella, is a tall straight tree, branched only at top; its bark is peculiarly whitish; the leaves stand alternately, and are placed upon short footstalks: they are oblong, obtuse, entire, dark-green, and thick: the flowers are small, seldom opening, violet-coloured, and grow in clusters upon divided footstalks at the tops of the branches: the calyx is monophyllous, and divided near its base into five lobes, which are roundish, concave, incumbent, green, smooth, membranous, and persistent; the corolla is composed of five petals, which are much longer than the calyx, sessile, oblong, concave, erect, and two of them narrower than the others; the nectary is pitcher-shaped, antheriferous, and deciduous; the anthers are twenty-one in number, distinct, attached longitudinally to the outside of the nectary, and discharge a yellow pollen; germen superior, ovate; style cylindrical, with two rough convex blunt stigmas. The fruit an oblong, one-celled, smooth, black berry.

The bark of this tree is imported from the West Indies, generally in long-quilled pieces, of a pale buff colour, an agreeable aromatic odour, and a warm pungent and somewhat bitter taste. The Materia Medica is already thronged with aromatics, and canella bark has nothing to recommend its preference. It contains volatile oil, bitter extract, and a portion of a peculiar saccharine matter which has been called *canellin.* In doses of ten grains to half a drachm, it is said to have been serviceable in cases of scurvy.

The only officinal preparation in which it forms an ingredient is the *Vinum Aloes.*

CANTHARIS. (*Κανθαρις*, Aristotle.) *Cantharis vesicatoria.* The Blistering Fly. Spanish Fly. Cantharides. The *Meloe vesicatorius* and *Lytta vesicatoria* of some writers.

We are chiefly supplied with cantharides from Astracan and Sicily, whence they are imported in casks and chests. They are, however, common in Italy and parts of France, being found on the privet, ash, elder, lilac, white poplar, and Tartarian honeysuckle; but it is only in warm climates that they attain perfection as vesicants, and their disagreeable odour and destructive habits are no inducements to their cultivation. They are collected early in the morning, by shaking the branches upon which they cluster, a service performed by men who are protected by masks and gloves; they are received upon cloths, and killed by exposure on sieves to the fumes of boiling vinegar; they are then dried in stoves.

Cantharides are about two-thirds of an inch long, and a fourth of an inch in breadth, of a rich green and golden colour, with long elytra marked with three longitudinal stripes, and covering brown membranous wings. The body is terminated by two small spines, and on the head are two black jointed feelers. The mandibles are strong, equal, and terminate in a point: there are no teeth; the jaws are lobated, and partly bony, partly membranous. The corslet is small, square, and less than the abdomen. The feet are furnished with filiform tarsi, and terminated by a double pair of long curved horny hooks. The larva of the cantharis live in the ground (*Thomson's Dispensatory*, Art. *Cantharis*).

Cantharides should be dry, and free from mould and dust, of a peculiar but not very strong nauseous odour, brilliant colour, and not mixed with other beetles, which is frequently the case to a great extent, especially with the *Melolontha vitis*, which may be distinguished by its black feet, and more square form. They may be kept for any length of time in a dry place, and secured from air; but they are very liable, notwithstanding their acrimony, to the attacks of small insects, which gradually reduce them to dust, without, however, materially affecting their activity.

When a watery extract of cantharides is digested in alcohol, a tincture is obtained, which, by slow evaporation, yields a resinous residue; if this be digested in ether, it forms a yellow solution; by spontaneous evaporation, it deposits crystalline plates, which are soluble in boiling alcohol, but precipitate as the solution cools. This, which is said to be the acrid principle of these insects, is associated with other varieties of inert fatty matter, with uric acid, and the phosphates of lime and magnesia (*Robiquet*, *Journ. de Chim. et Méd.*, IV. 354).

When taken internally, in doses not exceeding a grain, cantharides prove violently stimulant to the urinary and generative organs; their effects are usually sudden, and sometimes difficultly counteracted, and the diseases in which they have been administered often admit of a less objectionable system of treatment: to these effects we shall presently refer more in detail.

Applied externally, in the form of the *Emplastrum Cantharidis*, they stimulate and redden the skin, and afterwards excite a serous discharge from the exhalant vessels, which raises the cuticle in a blister: and this they do more certainly and effectually than any other substance. Though the application of blisters is often thought little of, some discernment is necessary in their use, for they sometimes excite irritation, restlessness, and fever, and prove more prejudicial than useful; sometimes they heal with difficulty, and have even produced troublesome and dangerous sores; sometimes the urinary organs are violently affected by absorption; and sometimes erysipelas is brought on to an alarming extent.

The cases demanding the application of blisters are principally the following:—To the head and neck in nervous fever, attended by delirious anxiety, dimness of sight, deafness, and general debility; also in paralytic affections, either to the head, or to the part or neighbourhood of the part affected. In all cases of internal inflammatory action, blisters applied near the affected part often transfer the increased action from it to the skin.

In spasmodic affections, cramp, and intermitting rheumatism and sciatica, blisters as often do harm as good. In peritoneal inflammation, and inflammation of the bowels, blisters should not be applied till the violence of the symptoms has been removed by bleeding and purgatives; for, by the general soreness of the abdomen which they produce, they prevent recourse to a most important criterion of the state of the disorder, namely, the degree of pain produced on pressure. Where, however, after the active symptoms have been subdued, a chronic form of disease is apprehended, blisters are of much service, and should generally be applied successively, at intervals not too long. In dropsical habits, in very irritable temperaments, in persons suffering from gravel, stone, stricture, or any kind of urinary irritation, blisters are, with few exceptions, contra-indicated (See the article *Cantharides*, in Dr. A. T. Thomson's *Dispensatory*, and in his *Elements of Materia Medica and Therapeutics*, for some useful practical remarks upon the above subject).

In applying blisters care should be taken to attach them to the part by a proper rim of adhesive plaster, for awkward accidents have sometimes happened from their changing their place; they should not, however, be bandaged down. A blister plaster should be removed as soon as the vesication is perfect, which usually requires from eight to twelve hours; and if urinary irritation is complained of, diluent and mucilaginous drinks of any kind should be freely administered.

It is not exactly known upon what the activity of the Spanish fly depends; its active constituents are dissolved both by alcohol and by water; hence the tincture of cantharides is often added to increase the energy of stimulating liniments.

The following are the preparations of cantharides in the present Pharmacopœia.

Tinctura Cantharidis.	Tincture of Cantharides.
℞ Cantharidis contusæ, drachmas quatuor,	Take of Cantharides, bruised, four drachms,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

This tincture is chiefly employed as an external stimulant and rubefacient, and with that intention is mixed with soap and camphor liniments. Dr. A. T. Thomson recommends a rag moistened with it as a useful application "in that peculiar species of mortification of the extremities which sometimes happens without any apparent cause; and to frost-bitten parts." Diluted with water it has been used as an injection in the cure of fistulous sores. It is occasionally prescribed in the dose of from ten to thirty drops twice a day, in defective action of the *sphincter vesicæ*, but its internal use always requires great caution.

Emplastrum Cantharidis.	Plaster of Cantharides.
℞ Cantharidis in pulverem subtilissimum contritæ, libram,	Take of Cantharides, in very fine powder, a pound,
Emplastri Ceræ, libram cum semisse,	Plaster of Wax, a pound and a half,
Adipis, libram dimidiam;	Lard, half a pound;
Emplastro et adipi simul liquefactis, et ab igne remotis, paulò antequam concrescant, cantharidem insperge atque omnia misce.	To the plaster and the lard, melted together and removed from the fire, a little before they concrete, sprinkle in the cantharides, and mix all of them.

Ceratum Cantharidis.	Cerate of Cantharides.
℞ Cantharidis in pulverem subtilissimum tritæ, unciam,	Take of Cantharides, in very fine powder, an ounce,
Cerati Cetacei, uncias sex;	Cerate of Spermaceti, six ounces;
Cerato igne emollito cantharidem adjice, et misce.	To the cerate, softened by fire, add the cantharides, and mix.

Unguentum Cantharidis.	Ointment of Cantharides.
℞ Cantharidis in pulverem subtilissimum contritæ, unciam,	Take of Cantharides, in very fine powder, an ounce,
Aquæ destillatæ, fluiduncias quatuor,	Distilled Water, four fluid ounces,
Cerati Resinæ, uncias quatuor;	Cerate of Resin, four ounces;
Aquam cum cantharide decoque ad dimidium, et cola. Liquori colato immisce ceratum; dein vaporet ad idoneam crassitudinem.	Boil down the water with the cantharides to one half; mix the cerate with the strained liquor; then let it evaporate to a proper consistence.

Of these preparations, the first has been above sufficiently adverted to; it is questionable whether the flies should be reduced to an extremely fine powder, as it is stated, upon practical authority, that when rather coarse than otherwise, the operation of the plaster is more certain, as a vesicant, and less apt to affect the urinary passages.

The *Ceratum Cantharidis* is intended as an active dressing to keep up the discharge from a blistered surface; and the *Unguentum Cantharidis*, in which the flies are not applied in substance, is a milder application for the same purpose; but when a blister is to be kept open, it should, if possible, be effected by some other irritant, such as savine ointment.

Of poisoning with Cantharides.—The action of cantharides in various forms, in reference to its toxicological effects, has been carefully studied by Orfila; he found that a drachm and a half of an oleaginous solution, injected into the jugular vein of a dog, killed it in four hours, with symptoms of violent tetanus; and that a mixture of eight grains of powdered cantharides with three drachms of the tincture, occasioned death in twenty-four hours, when retained in the stomach by a ligature on the gullet. Forty grains of the powder killed another dog, even when allowed to vomit, and in these cases, insensibility was the chief symptom, the stomach being found highly inflamed.

Applied to a wound, the powder excites inflammation, and one drachm proved fatal in thirty-two hours, without any constitutional symptom except languor.

From the cases cited by Dr. Christison and others, in illustration of the effects of this poison on the human subject, its *modus operandi* is not evident; strangury, tenesmus, violent irritation of the whole alimentary canal, attended by insatiable thirst, great pain in swallowing, salivation, and, in some instances, bloody vomiting, and discharge of blood from the urethra, were the leading symptoms. Where the genital organs are greatly affected, inflammation sometimes terminates in gangrene of the external parts. These symptoms are also often united with others indicating injury of the nervous system, such as delirium, tetanic convulsions, hydrophobia, dilated pupils, and coma. It deserves, however, especial remark, that the aphrodisiac powers of cantharides have been greatly overstated; that no venereal excitement whatever has in some cases resulted; and that in all instances, such excitement, when induced, is associated with violent constitutional symptoms of a very hazardous character.

The quantity of cantharides likely to produce dangerous or fatal results, appears liable to much idiosyncratic uncertainty. In some instances, doses not exceeding those which are considered safe in its medicinal employment, have been followed by alarming consequences; and, on the other hand, a case has been quoted by Dr. Beck, in which six ounces of the tincture were taken without injury. At all events, the internal use of cantharides, whether in powder or tincture, requires the utmost circumspection, and should only be resorted to in cases of extreme necessity. The *treatment* of poisoning by cantharides may be summed up in a few words. Vomiting should be encouraged, or induced by emetics; the strangury should be relieved by demulcent injections; leeches and blood-letting adopted, as may be required; the warm bath is a very useful auxiliary; oil and oleaginous mixtures are either useless or even injurious.

CAPSICUM (from *καπτω*, *I bite*). *Baccæ.* The berries of the *Capsicum annuum.* *Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

This annual plant is a native of both the Indies, and common in our gardens and greenhouses, flowering in July, and ripening its fruit in October. Stem herbaceous, round, smooth, crooked, branching, and about two feet high; leaves ovate, smooth, entire, irregularly placed on long footstalks; flowers peduncled, axillary, solitary, and white; calyx persistent, tubular, divided into five segments; corolla wheel-shaped, five-cleft, with pointed and plaited segments; filaments short and tapering, with oblong anthers; germen ovate; style slender, longer than the filaments; stigma blunt. The fruit is a conical pod, of a red or orange colour, containing a dry pulp and several flat kidney-shaped seeds. The fruit of the *Capsicum baccatum*, or *bird pepper*, is often substituted for the above in pharmacy. It is more pungent; the pods are small, shrivelled, and of a dingy-red colour.

Capsicum has been introduced into the Materia Medica on account of its powerfully stimulating qualities. Many varieties of capsicum probably enter into the composition of *Cayenne pepper*, which consists of their powder, mixed with a very variable proportion, but often about half its weight, of common salt. Other adulterations are practised upon it, such as the addition of coloured sawdust, and, according to some, of red lead; the latter fraud is very easily detected, by the rapidity with which it sinks in water through which the pepper is diffused, or by digesting it in dilute nitric or in acetic acid, and then applying to the filtered solution the usual tests for the detection of lead, such as sulphuretted hydrogen, and sulphate of soda—the former giving a black, and the latter a white, precipitate.

From 100 parts of capsicum Bucholz obtained—

Acrid resin (Capsicin)	4·0
Wax	7·6
Bitter extractive	8·6
Extractive, with little gum	21·0
Gum	9·2
Albuminous matter	3·2
Water	12·0
Woody fibre	28·0
Loss	6·4
	100

The best form for exhibiting capsicum is in pills, mixed with bread crumb, and of the genuine pepper from three to eight grains may be called a dose. The complaint in which it is most useful is flatulent dyspepsia. It is also considered as a good adjunct to cinchona, in the treatment of some forms of ague, and has been prescribed in the advanced stages of acute rheumatism. As a gargle, it furnishes a valuable remedy in some kinds of sore throat, more especially in the milder forms of ulcerated sore throat. The *tincture* is a convenient form in such cases. From half a drachm to two drachms may be added to six ounces of infusion of roses, or other proper diluent; but as its pungency is variable, and as different throats bear it differently, it is difficult to lay down the precise dose. An infusion of the berries may be used as follows:—

℞ Capsici Baccarum contus. gr. x.
Aquæ ferventis, f℥viij. Infunde per horas duas et cola.

℞ Colati Liquoris, f℥vij.
Mellis Rosæ,
Tinctur. Myrrhæ, āā. f℥ss.;
M. fiat gargarisma frequenter utendum.

A cayenne-pepper poultice is often used in the West Indies as a rubefacient, and as a counter-irritant in the delirium of fever, and persons who complain of cold feet have found comfort from wearing socks dusted with cayenne pepper.

The only officinal preparation of capsicum is the *tincture*, of which from ten drops to half a drachm is the usual dose, given in ten or twelve drachms of any proper vehicle, such as infusion of gentian, or of roses; it also furnishes, as above stated, a good source of the cayenne gargle, and may occasionally be added to stimulating liniments.

TINCTURA CAPSICI.	TINCTURE OF CAPSICUM.
℞ Capsici contusi, drachmas decem,	Take of Capsicum bruised, ten drachms,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

CARBO ANIMALIS. *Carbo ex carne et ossibus coctus.* CARBO LIGNI. *Carbo e ligno coctus.* Animal Charcoal prepared from flesh and bones. Charcoal of wood.

The animal charcoal which is produced by the combustion of flesh, is comparatively pure with that obtained by burning bones; the latter, however, is the article which usually occurs under the name of *animal charcoal;* according to the kind of bone from which it has been procured, it contains more or less of earthy salts, chiefly phosphate of lime; this may be removed by the action of hydrochloric acid, and when bones have been well burned in close vessels, and afterwards reduced to powder and digested in dilute hydrochloric acid, the remaining charcoal is sufficiently pure. There is, however, but little of it obtained, and flesh of any kind is too expensive to be extensively employed. Perhaps the cuttings of hides and skins, which form the offal of the tan-yard, together with horns, hoofs, and similar refuse, are the most economical sources of animal coal. In some cases it is procured by burning old shoes, which are collected for the purpose, and sold at the rate of from a halfpenny to a penny a pair. The following are the directions of the *London Pharmacopœia* for the purification of animal charcoal:—

CARBO ANIMALIS PURIFICATUS.	PURIFIED ANIMAL CHARCOAL.
℞ Carbonis Animalis, libram, Acidi Hydrochlorici, Aquæ, singulorum, fluiduncias duodecim;	Take of Animal Charcoal, a pound, Hydrochloric Acid, Water, of each, twelve fluid ounces;
Acidum hydrochloricum aquæ misce, et carboni paulatim superinfunde, tum per dies duos, leni calore digere, subindè agitans. Sepone, et liquorem supernatantem effunde, tum aquâ sæpiùs renovatâ carbonem lava, donec acidi nihil percipiendum sit; denique exsicca.	Mix the hydrochloric acid with the water, and gradually pour it upon the charcoal, then for two days digest it in a gentle heat, occasionally agitating. Set aside, and pour off the supernatant liquor, then wash the charcoal with repeated portions of water, till no traces of acid are perceivable; lastly dry it.
NOTA.	NOTE.
Carbo Animalis (purificatus) acido hydrochlorico adjecto nullas bullulas emittit; nec quicquam ex hoc acido demittitur, adjectâ vel ammoniâ, vel ammoniæ sesquicarbonate.	Animal Charcoal (purified) emits no bubbles on the addition of hydrochloric acid; nor is anything thrown down from this acid, by the addition either of ammonia, or of sesquicarbonate of ammonia.

In the preceding directions, the digestion in dilute hydrochloric acid, and subsequent washing, removes the carbonate and phosphate of lime, and the traces of magnesia and other salts, with which animal charcoal, and especially that of bone or ivory, is mixed; and the absence in the "purified animal charcoal," of carbonate and phosphate of lime, is indicated by the test of hydrochloric acid, which, after having been digested with it, and then filtered off and tested by pure and by carbonate of ammonia, affords no traces of phosphate of lime, which would be thrown down by the former reagent, or of carbonate of lime (which would be thrown down were any chloride of calcium present,) by the latter.

The *charcoal of wood* is procured by burning different kinds of wood with the imperfect access of air, and when the volatile matters are expelled, and the heap no longer emits smoke, the air-holes are closed, and the pile is allowed to cool. As wood of different size and quality is employed, common charcoal is of variable character, and often imperfectly carbonized; its ash is always alkaline, from the presence of carbonate of potassa. There is also a large quantity of charcoal, generally of a superior quality, prepared by gunpowder-makers, and by the distillers of pyroligneous acid; for these purposes, the carbonization is carried on in iron cylinders, and the volatile products, among which are tar, water, acetic acid, and acetic spirit, are carefully condensed.

Among the most remarkable properties of charcoal, is its power of destroying the colour, smell, and taste, of many organic products; thus, when coloured infusions are filtered through it, they are not unfrequently rendered colourless, and hence its pharmaceutical applications in the preparation of some of the alkaloids and their salts (see *Aconitina*, *Morphiæ Hydrochloras*, *Quiniæ Disulphas*, &c.), and its use upon an extended scale in some of the arts, more especially in the refining of sugar. It also removes the disagreeable odour and flavour of putrescent substances, and restores, to a certain extent, their characters of freshness. Foul water, filtered through charcoal, is rendered insipid and pellucid,—whence its use in filtering machines. These curious effects are more easily obtained by the use of animal than of vegetable charcoal, especially as relates to the destruction of colour, a difference depending, according to the experiments of Bussy (*Journal de Pharmacie*, Juin, 1822), on its porosity, no hard or brilliant charcoal being effective.

The medical uses of charcoal are not very important. It is placed by most writers among the *antiseptics*, and has been administered in the doses of twenty to sixty grains, to correct the offensive eructations that occur in some cases of dyspepsia. But these annoying eructations generally follow certain kinds of food only, and these should be avoided. Mixed with the common poultice, it is said to be useful in foul and gangrenous sores. It is often recommended as an ingredient in tooth-powder, for which purpose it is mixed with chalk, and small portions of rhatany powder, or of kino or catechu. According to Dr. Paris, the article sold as a tooth-powder under the name of *prepared charcoal*, is prepared chalk rendered gray by the addition either of powdered charcoal, or of lamp-black. The objection to these otherwise harmless applications of charcoal, is its smuttiness, especially when it is used alone; otherwise it certainly well cleanses the teeth.

Charcoal or carbon, as a chemical element, is of the highest interest and importance; its identity with the diamond is proved by that of the results of their combustion in oxygen, both of them yielding, when pure, no other result than carbonic acid. The diamond, however, is probably the only known form of absolutely pure carbon. Carbon is an essential element of all organic matter, being associated with all forms of lviing beings. It forms *carbonic acid gas* when saturated with oxygen, as when burned with the free access of air, or in excess of pure oxygen gas; in certain cases of imperfect combustion, it yields a distinct and inflammable gaseous compound, *carbonic oxide*.

At all common temperatures and pressures, free carbonic acid exists as a gas; but, according to the experiments of Faraday, it is liquefiable at the temperature of 32° by a pressure equivalent to that of thirty-six atmospheres (*Phil. Trans.*, 1823), and it has been obtained in a concrete form by Thilourier (*Ann. de Chim. et Phys.*, LX., 427). The specific gravity of carbonic acid gas is to that of air as 152 to 100, and to that of hydrogen as 2200 to 100. The weight of 100 cubical inches, at mean pressure and temperature, is 47·3 grains. The equivalent of carbon is = 6; and assuming carbonic acid as constituted of 1 atom of carbon in combination with 2 of oxygen, the following will represent its composition:—

	Atoms.	Equivalents.	Per Cent.
Carbon	1	6	27·27
Oxygen	2	16	72·73
Carbonic Acid	1	22	100·00

Carbonic oxide is the lowest degree of the oxidizement of carbon; it is a permanently elastic gas, somewhat lighter than atmospheric air; its specific gravity being to that of air as 97 to 100, and to that of hydrogen as 1400 to 100. The weight of a 100 cubic inches of carbonic oxide, at mean temperature and pressure, is 30 grains, and it consists of—

	Atoms.	Equivalents.	Per Cent.
Carbon	1	6	42·9
Oxygen	1	8	57·1
Carbonic oxide	1	14	100·0

Carbonic acid is often employed medicinally in the form of water impregnated with it, either alone, or with alkalis, as in the *Liquor Potassæ effervescens* and *Liquor Sodæ effervescens* of the Pharmacopœia (*see* Potassa, and Soda). The effervescing saline draught is also a useful form of carbonic acid; and there are many of the sparkling mineral waters which derive much of their efficacy from the large quantity of free carbonic acid which they hold in solution. All these forms of carbonic acid are refreshing, exhilarating, and sedative to the stomach, and are often very effective in allaying nausea and vomiting, and relieving some of the most troublesome cases of dyspepsia; the highly carbonated waters, if drunk in excess, occasion giddiness and intoxication; and champagne, and similar sparkling wines, which are remarkably rapid in their inebriating effects, owe much of their power to free carbonic acid, for they are less active when the gas has escaped. In some morbid conditions of the urine and in cases of phosphatic diathesis, water impregnated with carbonic acid may be advantageously used as common drink; it often agrees with the stomach, and relieves the symptoms when the more powerful acids irritate and disagree.

An important part of the medical history of carbonic acid, relates to its effects as a *poison*. When a person is immersed into an atmosphere of carbonic acid gas, he is suffocated; the glottis is spasmodically closed, and the access of air to the lungs as effectually prevented as by immersion in water. But when the carbonic acid is more or less diluted by air, and when the gas has actual access to the blood, the effects are perfectly distinct, and resemble those of a narcotic poison. Cases of the former kind occur in breweries, when persons inadvertently go into a vat from which the carbonic acid has not been expelled; and miners and well-diggers are sometimes suffocated in the same way, by incautiously descending shafts or wells in which the gas has been suffered to accumulate; the term *choke damp* is in these cases applied to this gas; and the simple precaution of letting down a lighted candle indicates the danger by its extinction, for no person can breathe where a candle will not burn.

The gradual poisoning by carbonic acid is also no uncommon occurrence. The most frequent cases are those occasioned by the employment of *brasiers*, or open charcoal fires, for the purpose of airing cold or damp rooms, where the ventilation is imperfect, or where there is no chimney. Even small chauffers of charcoal cannot be used without risk; and carbonic oxide, and carburetted hydrogen, the other occasional products of burning charcoal, are equally deleterious with carbonic acid. Oppressed respiration, palpitation, faintness, vertigo, tightness about the temples, and final insensibility, appear to be the symptoms which the respiration of diluted carbonic acid produces. Some have described an agreeable drowsiness as the first effect, followed by faintings. The following abstract of a case, by Dr. Babington, is quoted by Dr. Christison, as illustrative of the advanced symptoms:—

"The waiter of a tavern, and a little boy, on going to bed, left a chauffer of burning coal beside it, and next morning were found insensible. The boy died immediately after they were discovered. The waiter had stertorous breathing, livid lips, flushing of the face, and a full strong pulse, for which affections he was bled to ten ounces. When Dr. Babington first saw him, however, the pulse had become feeble, the breathing imperfect, and the limbs cold; the muscles were powerless, and twitched with slight convulsions; the sensibility gone, the face pale, the eye-lids closed, the eyes prominent and rolling, the tongue swollen, and the jaw locked upon it, and there was a great flow of saliva. The employment of galvanism at this time caused an evident amendment in every symptom; but it was soon abandoned, because each time it was applied the excitement was rapidly followed by a corresponding depression. Cold water was then dashed upon him, ammonia rubbed on his chest, oxygen thrown into the lungs, and, through these and other means, a warm perspiration was brought out, and his state rapidly improved. He was nearly lost, however, during the subsequent night, by hæmorrhage from the divided vein; but next day he was so well that he could even speak a little. For two days afterwards the left side of the face was paralysed, and his mental faculties were somewhat disordered."

Analogous to these cases of poisoning are those in which persons have been crowded together in a confined space. In the instance of the *Black Hole* at Calcutta, one hundred and forty-six individuals were imprisoned in a room twenty feet square, with only one small window, and before the next morning, one hundred and twenty-three died under the most horrible sufferings. The oppressed respiration, faintness, and excessive anxiety, which delicate persons frequently experience in crowded rooms, where many lights are burning, and where the ventilation is insufficient, are the incipient symptoms of similar cause.

The *post mortem* examination of persons who have died from carbonic poisoning, generally shows fulness of the cerebral vessels, and occasional effusion of blood in some part of the brain. The countenance is described in most cases as pale and placid. Careful bloodletting from the arm or head, and occasional cold affusion, is the leading plan of treatment as respects the primary symptoms.

CARDAMINE. *Flores.* The flowers of the *Cardamine pratensis. Cl.* 15. *Ord.* 2. Tetradynamia Siliquosa. *Nat. Ord.* Cruciferæ.

This plant is known under the name of *Cuckoo Flower*, or *Lady's Smock;* the term *Cardamine* is said to be derived from *καρδια*, *the heart*, and to imply its cordial and strengthening qualities. It is common in moist meadows, and flowers in April and May. Its root is perennial, ramose, and fibrous; stalk erect, round, smooth, about nine inches high; leaves pinnated, radical leaves frequently wanting, otherwise spreading in an orbicular shape, with roundish pinnæ, which are dentated; leaves upon the stalk are erect, and consist of four or five pair of pinnæ, which are narrow, spear-shaped, concave, pointed; the flowers terminate the stem in a cluster, and stand upon smooth naked peduncles; the calyx is composed of four scaly leaves, which are oblong, obtuse, concave, deciduous, and alternately protuberant at the base; the corolla is cruciform, and of a purplish-white colour, the petals veined reticularly, and a little notched at the apex; the filaments six, four long and two short; the anthers small, oblong, and upright; there is no style; the ovary is round and slender, and becomes a long compressed pod of two valves, which, on opening, roll back spirally, and in the cells are many round seeds.

The flowers dried have been given in doses of from one to three drachms, in several spasmodic and convulsive diseases; but they are of too doubtful efficacy to require detailed notice. The flavour of watercress predominates in the whole plant, and the leaves are sometimes used in salad.

CARDAMOMUM. *Semina.* The seeds of the *Alpinia cardamomum. Cl.* 1. *Ord.* 1. Monandria Monogynia. *Nat. Ord.* Scitamineæ.

The cardamom tree is a native of India; it is about twelve feet high; it has a jointed, tortuous, fibrous root; the stems are round, smooth, and about an inch thick; the leaves alternate, sheathing, broad, green, and striated; they have an aromatic taste and smell; the flowers are in racemes, sent off from the root, and creep along the ground; they have oblong leaflets like capsules; the bract is monophyllous, inferior, and divided at the margin into three obtuse teeth; the corolla is monopetalous, tubular, and four-cleft; the three outer segments are long, narrow, and straw-coloured, and the central one large, broad, concave, and oval. The filament is broad, slightly grooved, supporting a double emarginate, crestless anther, having a deep fissure between its lobes to receive the style, which is slender, and bears a funnel-shaped ciliated stigma: the capsule is berried and trilocular.

The seeds, contained in their capsules or pods, are imported from Bengal, in cases of about 1 cwt. each; those which are small, broad, and heavy, are preferable to the longer kinds, which contain fewer seeds, and less closely packed; the capsules are insipid, but the seeds (which are sometimes found in trade out of the capsules) are pungent and aromatic.

Martius obtained 76 grains of essential oil from four ounces of seeds. Their chief use is in combination with other remedies, especially cathartics and bitter tonics; thus we find them in the *Extractum Colocynthidis compositum*, and in the *Tinctura Rhei*, and *Tinctura Sennæ*, of the Pharmacopœia.

TINCTURA CARDAMOMI.	TINCTURE OF CARDAMOM.
℞ Cardamomi contusi, uncias tres cum semisse,	Take of Cardamom, bruised, three ounces and a-half,
Spiritûs tenuioris, octarios duo;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

TINCTURA CARDAMOMI COMPOSITA.	COMPOUND TINCTURE OF CARDAMOM.
℞ Cardamomi,	Take of Cardamom,
Carui, singulorum contritorum, drachmas duas cum semisse,	Caraway, of each, powdered, two drachms and a-half,
Cocci contriti, drachmam,	Cochineal, powdered, a drachm,
Cinnamomi contusi, drachmas quinque,	Cinnamon, bruised, five drachms,
Uvæ, uncias quinque,	Raisins, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

Of these tinctures, the first is a good carminative, and may be added, in the proportion of half a drachm to a drachm, to aperient and stomachic draughts. The compound tincture is a pleasant cordial, and is principally used in consequence of its red colour, to impart an agreeable tint to various formulæ.

CARMINATIVES. (From *Carmen*, a verse or *charm.*) This term is generally applied to medicines which allay pain and flatulency of the stomach and bowels; they are chiefly aromatics.

CARUI. *Fructus*. The *fruit* of the *Carum Carui*. *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

What is here termed *Carui fructus*, is usually known under the name of *Caraway seed*, so called, it is said, from *Caria*, a province of Asia, whence it was first obtained. The plant is an indigenous perennial, found in meadows and pastures; it is cultivated for the sake of the seed, which also is imported from Holland and elsewhere, but the English is usually preferred, being more plump, fresh, and aromatic than the Dutch, which is often insipid and mouldy. The plants do not perfect their seed till the second year, when they are cut, dried, and threshed: they usually ripen in August, the flowers expanding in May and June. The root of this plant is long, thick, white, and of a warm flavour; the stalk is round, channelled, branched, and from two to three feet high; the leaves are long, and sub-divided into many pinnæ, which are narrow, pointed, deep-green, and aromatic: the flowers grow in terminal umbels, generally consisting of ten radii, and furnished with a general and a partial involucrum, each of which consists of four or five narrow segments. The corolla consists of five roundish blunt petals, white, and curled inward at the ends; the five filaments are slender, of the length of the petals, and crowned with small yellow anthers; the styles are short, capillary, and furnished with simple stigmas; the achænia are two, oblong, bent, about one-fourth of an inch in length, of a brown colour, with five straw-coloured longitudinal ridges.

The principal consumers of caraway-seed are the confectioners and gingerbread-bakers. Their agreeable aromatic warm flavour is derived from the presence of essential oil, which they yield, on distillation, in the proportion of about three per cent. They are usefully added to purgative remedies to prevent griping; and are sometimes administered in colic and flatulency, in the form of powder, the dose of which is from twenty to sixty grains. The distilled oil, spirit, or water are, however, generally substituted for the seed in substance.

The *Aqua Carui* of the Pharmacopœia is directed to be prepared in the same way as *Aqua Anethi*, namely, by the distillation of a pound and a-half of bruised seed, seven ounces of proof spirit, and two gallons of water; one gallon is to be distilled. It is a good vehicle for magnesia, or for sulphate of magnesia, in small aperient doses; it may also be used as a carminative for children who are troubled with flatulency, a tea or dessert spoonful being given occasionally, slightly sweetened.

SPIRITUS CARUI.	SPIRIT OF CARAWAY.
℞ Carui contusi, uncias viginti duo,	Take of Caraways, bruised, twenty-two ounces,
Spiritûs tenuioris, congium,	Proof Spirit, a gallon,
Aquæ, octarios duos;	Water, two pints;
Misce; tum lento igne destillet congius.	Mix; then by a gentle heat let a gallon distil.

This is a good carminative spirit, and a useful addition to purgative remedies, to prevent flatulency and griping. When sweetened with refined sugar it forms a *liqueur* much used in Germany.

The essential *oil of caraway* has a place among the OLEA DESTILLATA of the Pharmacopœia; it is often added to cathartic pills, and occasionally to powders, in the dose of one or two drops.

CARYOPHYLLUS. *Flores nondum explicati, exsiccati.* CLOVES. The unexpanded flowers, dried, of the *Caryophyllus aromaticus. Cl.* 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Myrtaceæ.

CARYOPHYLLI OLEUM. Oil of Cloves. *Oleum e floribus destillatum.* The oil distilled from the flowers.

The clove tree is a native of the Moluccas; its wood is hard and covered by a gray bark; the leaves are large, entire, oblong, lanciform, of a bright-green colour, and stand in pairs upon short footstalks; the flowers terminate the branches in bunches; the calyx of the fruit is divided at the brim into four permanent pointed segments, and that of the flower is composed of four leaflets, which are roundish, concave, deciduous, and placed above the ovary; the corolla consists of four petals, which are roundish, notched, small, and of a blue colour; the filaments are numerous, slender, inserted in the calyx, and furnished with simple anthers; the ovary is oblong, large, terminated by the calyx of the fruit, and placed below the insertion of the corolla; the style is tapering, and the stigma simple; the pericarp is one-celled, umbilicated, and terminated by the indurated converging calyx; the seed is a large oval berry.

A vigorous tree, of twelve years old, yields annually from five to twenty pounds weight of flowers; the largest trees are above eight feet diameter, and yield from fifty to sixty pounds. The fruit had a place in the old Materia Medica, under the name of *Anthophylli:* it is of the size of a small plum, and nearly insipid; the bark, root, and leaves of the tree, are to a certain extent impregnated with its aromatic flavour.

Cloves are imported from the Dutch settlements in India in chests and bags. They are of a rich brown colour, a very fragrant aromatic odour, and hot and acrid upon the tongue. A portion of oil exudes from their broken surface, when gently pressed by the nail. The inferior varieties are dark, shrunk, and less warm and odorous; they are said to be mixed with cloves from which the oil has been extracted. Good cloves yield, on distillation, about one-sixth their weight of essential oil; but the proportion and quality of the oil varies with the quality of the spice. Tromsdorff obtained from 100 parts of cloves—

Volatile oil	18
Tasteless resin	6
Peculiar astringent matter . . .	13
Extractive	4
Gum	13
Water	18
Woody fibre	28
	100

According to Lodibert (*Journ. de Pharm.* XI., 101) a crystallisable substance is separable from the finest Oriental cloves, by the action of cold alcohol; it is described under the name of *caryophyllin*, as a species of camphor.

The *essential oil of cloves* is largely distilled in many of our pharmaceutical laboratories; in the Pharmacopœia it is placed in the list of the Materia Medica. It is pungent and aromatic, but wants the fragrancy of the clove itself. It varies in colour; when very pale, or very dark, its purity may be suspected; but its tint varies with its age. Its specific gravity always exceeds that of water, and varies, according to different authorities, from 1034 to 1232. Its boiling-point is much above that of water, but it readily passes over in distillation with aqueous vapour; not so with the vapour of alcohol. It remains fluid at 0°. It is perfectly soluble in alcohol, ether, and concentrated acetic acid, and, in common with oil of pimenta, has the property of uniting with alkalis and other bases, and forming definite, and, in many cases, crystallisable compounds.

Cloves are a good stimulating aromatic, and of frequent use as a condiment, improving the flavour of insipid food, and promoting digestion; they render bitter and aperient medicines more agreeable, both to the palate and stomach, and the simple infusion is a grateful stomachic in dyspepsia, chronic gout, and flatulent colic.

INFUSUM CARYOPHYLLI.	INFUSION OF CLOVES.
℞ Caryophylli contusi, drachmas tres,	Take of Cloves, bruised, three drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours, in a vessel lightly closed, and strain.

A *tincture of cloves*, made by digesting two ounces of bruised cloves in eight ounces of rectified spirit, for six or eight days, and then filtering off the clear solution, is an elegant and useful preparation; the dose is from ten minims to a drachm, as an addition to stomachic and tonic draughts and mixtures. A distilled water of cloves has a place in some Pharmacopœiæ, but pimenta water may be in all cases substituted for it.

Oil of cloves is chiefly employed as an addition to purging pills and powders, preventing flatulency and griping; one or two drops is a dose. It is also used to relieve toothache. Its alcoholic solution is far less agreeable than the tincture above adverted to; it becomes milky on the addition of water.

CASCARILLA. *Cortex.* The bark of the *Croton Eleuteria. Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Euphorbiaceæ.

This tree, from which the cascarilla bark of commerce is supposed to be obtained, is a native of the Bahama Islands, Jamaica, and St. Domingo. It is not more than twenty feet high, and branching at top. A viscid balsam oozes from the broken shoots. The leaves are alternate, on short petioles, ovate, lanceolate, entire, and bright green; the flowers are in axillary and terminal racemes; the petals white, oblong, obtuse, and spreading; the male flower has ten subulate filaments, supporting erect, compressed anthers; the female flower produces a roundish ovary, crowned with three bifid spreading styles, with obtuse stigmas; the capsule is superior, trilocular, and contains one shining seed.

Cascarilla bark is principally imported from Eleutheria, one of the Bahama Islands. It occurs in quilled and broken pieces; it has a short and resinous fracture, and is of a deep brown colour in the interior. Its odour is aromatic; it is easily inflammable, and when burnt it exhales a strong, musky odour, which is very peculiar. Its taste is aromatic, warm, and bitter. Stale, inodorous, and merely bitter cascarilla, and that which is very small and dusty, is to be rejected.

Tromsdorff obtained the following proximate products from 100 parts of cascarilla:—

Volatile oil	1·6
Bitter extract and gum	18·7
Slightly bitter resin	15·1
Woody fibre	64·6
	100

INFUSUM CASCARILLÆ.	INFUSION OF CASCARILLA.
℞ Cascarillæ contusæ, unciam cum semisse,	Take of Cascarilla, bruised, an ounce and a-half,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours, in a vessel lightly closed, and strain.

TINCTURA CASCARILLÆ.	TINCTURE OF CASCARILLA.
℞ Cascarillæ contritæ, uncias quinque,	Take of Cascarilla, bruised, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

The term *Cascarilla* is the diminutive of the Spanish word *cascara*, or *bark*, and at one time a variety of barks employed in medicine were similarly designated. It was first employed in Germany as a febrifuge and general tonic, and as a substitute for cinchona in the cure of intermittents; but to such merit it has no claims; it is a very useful aromatic and stimulant bitter, and especially useful in atonic and flatulent dyspepsia, in the after-treatment of diarrhœa, and mild forms of dysentery, and cholera.

The *infusion* is by far the best form in which cascarilla can be administered, to which the *tincture* may occasionally be added; of the former the dose is an ounce and a half, and of the latter half a drachm to a drachm, twice or thrice a day. The infusion may also be employed as a vehicle for powdered Peruvian bark, and for small doses of sulphate of magnesia and sulphuric acid, in debility of stomach attended by constipation; and in acidity of the *primæ viæ*, for carbonate of ammonia.

The following are formulæ fulfilling these intentions:—

℞ Infusi Cascarillæ, f℥vss.
Tincturæ Cascarillæ, f℥ss.
M. fiat mistura. Cochlearia tria ampla pro dosi, bis vel ter die.

℞ Infusi Cascarillæ, f℥j.
Infus. Rosæ compos. f℥ss.
Magnes. sulphatis, ʒj.
Acid Sulphur. diluti, ♏v.
M. fiat haustus bis die sumendus.

℞ Infusi Cascarillæ, f℥iss.
Cinchonæ lancif. pulv. ℈j.
Tinctur. Cardam. compos. ʒj.
M. fiat haustus.

℞ Infus. Cascarillæ, f℥vss.
Spirit. Ammoniæ compos.
Tincturæ Cascarillæ, āā. ʒij.
M. Capiatur cochlearia iij. ampla pro re natâ.

CASSIA. *Leguminum pulpa.* The pulp of the pods of the *Cassia fistula. Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Leguminosæ. (*Cathartocarpus fistula* of Necker.)

This species of cassia is a native of Egypt and of the East and West Indies, and flowers in June. It is a spreading lofty tree, covered with gray bark; the leaves consist of six pair of ovate pointed pinnæ, with transverse nerves, peduncled, and of a pale-green colour. The flowers are yellow, placed upon long pendant spikes: the leaves of the calyx are crenated, blunt and greenish; the petals unequal, spreading, and waved; the three inferior filaments are long and curved; the others have large anthers, three of which are rostrated at the extremity. The fruit is a cylindrical woody pod, of a dark brown colour, from about eighteen to twenty-four inches in length; it has a longitudinal furrow on each side, and is subdivided internally into numerous transverse cells, each of which contains a smooth oval yellowish seed, embedded in a soft black pulp. The finest pods are from the East Indies; they should be full-sized, heavy, and free from rattling seeds, which indicates that they are dry and old.

The pulp is usually separated by digesting the bruised pods in hot water, rubbing it through a sieve, and reducing it, by evaporation, to a proper consistency; it then has a dark brown colour, a sickly odour, and a sweet, mucilaginous, and somewhat nauseous taste. It contains, according to Henry (*Journn. de Chim. et Méd.* II., 370), sugar, 61·00; gum, 6·75; tannin, 13·85; gluten, colouring matter, and water, 18·40. There must, however, be some other peculiar principle in this pulp, from which its purgative powers are derived. In sufficient doses it acts briskly upon the bowels, but is apt to gripe and create flatulency: from two to six or eight drachms is the average dose. It forms an ingredient in the *Confectio Sennæ* (*see* SENNA), and in the following formula of the Pharmacopœia, which is sometimes administered as a laxative to children, in the dose of two or three drachms.

CONFECTIO CASSIÆ.	CONFECTION OF CASSIA.
℞ Cassiæ, libram dimidiam,	Take of Cassia (*pulp*), half a pound,
Mannæ, uncias duas,	Manna, two ounces,
Tamarindi, unciam,	Tamarind (*pulp*), an ounce,
Syrupi Rosæ, fluiduncias octo;	Syrup of Roses, eight fluid ounces;
Mannam contunde, tum in syrupo liqua; deindè admisce cassiam et tamarindum, et humorem consume, donec idonea fit crassitudo.	Bruise the manna, then dissolve it in the syrup; afterwards mix the cassia and tamarind (*pulps*), and evaporate the moisture, till a proper consistence is attained.

CASTOREUM. *Castor* (*γαστωρ*, a big-bellied animal). *Castor fiber. Concretum in folliculis præputii repertum.* A concrete found in the follicles of the prepuce of the beaver.

These follicles contain about an ounce and a-half, or two ounces, of a brown, viscid, fetid substance; they are usually cut off and dried, when their contents become indurated and pulverulent.

Two varieties of castor are met with; one from Russia, Prussia, and Poland, and now scarcely to be obtained: the pods are large and firm, their contents dry, of a brown colour, pulverulent, of a peculiar odour, and a bitter taste; the other is imported from Canada, and is the only variety now found in the drug market: the pods are flatter and smaller than the former, and their contents are of a yellowish colour, of a resinous appearance, and faint nauseous odour; or sometimes soft, viscid, and fetid; sometimes black and insipid. The yellow resinous kind is usually preferred. But although castor has been extolled as an antispasmodic, its virtues have always been deemed equivocal, and the uncertain composition and quality of the article, as it now occurs in trade, should have rejected it from the Pharmacopœia.

100 parts of fresh Russia castor contain, according to Bonn (*Geiger's Pharmacie*, II., 1959)—

Volatile oil	34? (and water?)
Fatty matter and resin (Castorin?) . .	23
Carbonate of lime	24
Cellular membrane	19
	100

100 parts of Canada castor from the interior of the pouch, consist of—

Volatile oil, water and fibre . .	22·7
Adipocere and resin (Castorin) . .	11·9
Carbonate of lime	52·8
Phosphate of lime	10·0
Peculiar extractive matter and saline substances (trace of uric acid) . .	2·6
	100

In these analyses the term *castorin* is applied to a peculiar principle said to exist in castor, by Bizio, and by Brandes, and to confer upon it remedial virtues; but Chevallier and others have not succeeded in detecting it. The fat and the blood of the beaver were formerly highly esteemed on account of their supposed medicinal efficacy, but have long been disused; there can be no doubt that the nastiness with which the drug-trade now supplies the apothecary, under the name of castor, is equally inefficient. The dose in which this article is to be administered is variously stated as from five to twenty or thirty grains, and half an ounce has been given with no other inconvenience than that of nausea. The tincture is sometimes employed as adjunct to antihysterical emmenagogues.

TINCTURA CASTOREI.	TINCTURE OF CASTOR.
℞ Castorei contriti, uncias duas cum semisse,	Take of Castor in powder, two ounces and a half,
Spiritûs rectificati, octarios duos;	Rectified Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

CASTOR OIL, *see* RICINI OLEUM.

CATAPLASMA (καταπλασσειν, to spread over.) A poultice, or cataplasm.

Poultices are for the most part emollient and soothing applications to inflamed and irritable parts; their action is often merely dependant upon warmth and moisture; in other cases it is of a more specific character, as when they contain sedative or stimulating ingredients. Common farinaceous poultices, such as bread softened by soaking in boiling water, or bread and milk, or linseed poultice, are the usual emollients of this class. The plain bread and water poultice is scarcely tenacious enough to admit of convenient application, but the addition of a little flour and water, in the form of paste, or of a small quantity of linseed meal, renders it so. The bread and milk poultice is often a peculiarly soothing remedy; it should be made with fresh milk, and renewed at least every twelve hours, though its occasional acescency is of little consequence. The following "cataplasmata" are retained in the late edition of the *London Pharmacopœia:*—

CATAPLASMA CONII.	CATAPLASM OF HEMLOCK.
℞ Extracti Conii, uncias duas,	Take of Extract of Hemlock, two ounces,
Aquæ, octarium,	Water, a pint;
Misce, et adde	Mix, and add
Lini seminum contusorum quod satis sit, ut idonea fiat crassitudo.	Linseed bruised, a sufficient quantity to produce a proper consistency.

This poultice sometimes allays pain in irritable ulcerating sores, and even in those of a cancerous character; but it occasionally proves rather irritating than otherwise, so that it requires caution in its application. It has also been applied to scrofulous glandular tumours.

Cataplasma Fermenti.	Cataplasm of Yest.
℞ Farinæ, libram,	Take of Flour, a pound,
Cerevisiæ fermenti, octarium dimidium;	Yest of beer, half a pint;
Misce, et calorem lenem adhibe, donec intumescant.	Mix, and apply a gentle heat, till they begin to swell.

The intumescence of this poultice depends upon the evolution of carbonic acid, to which the efficacy of the application is generally ascribed; it is represented as accelerating the sloughing of sores, and correcting the fœtor of foul ulcers.

Cataplasma Lini.	Cataplasm of Linseed.
℞ Aquæ ferventis, octarium,	Take of boiling Water, a pint,
Lini seminum contritorum, quod satis sit, ut idonea fiat crassitudo;	Bruised Linseed, as much as may be sufficient to produce a proper consistence;
Misce.	Mix.

This poultice is frequently made with linseed meal, from which the oil has been expressed, and is then apt rather to irritate than to soothe; when prepared with freshly powdered seed, it is an oily and almost unctuous application, and of a good consistence.

Cataplasma Sinapis.	Cataplasm of Mustard.
℞ Lini seminum,	Take of Linseed,
Sinapis, singulorum contritorum, libram dimidiam,	Mustard seed, each, in powder, one pound,
Aceti fervefacti, quantum satis sit, ut fiat cataplasmatis crassitudo.	Hot Vinegar, a sufficient quantity to produce the consistency of a cataplasm.

In cases of apoplexy and coma, this stimulating poultice is sometimes applied to the soles of the feet or to the calves of the legs, with a view of producing a revulsion, or counter-irritation of those distant parts; it has been similarly used in the low stage of typhus fever, where oppression of the brain is indicated by stupor or delirium. These and similar applications are of doubtful efficacy, and perhaps rather theoretically than practically useful.

As an application to foul and fetid ulcers and gangrenous sores, the *Cataplasma Chlorinata* of the hospitals deserves a place among these formulæ. It is made by the addition of a properly-diluted solution of *chloride of lime*, or *chloride of soda*, to a cool bread and water poultice, thickened by a little linseed meal.

CATECHU (from *kate*, a tree, and *chu*, juice: Japanese). *Ligni extractum.* The *extract of the wood* of the *Acacia Catechu.* *Cl.* 23. *Ord.* 1. Polygamia Monœcia. *Nat. Ord.* Leguminosæ.

This tree, which is a native of the mountainous parts of Hindostan, flowers in June; it is about twelve feet high, and one in diameter, and covered with a rough brown bark; towards the summit it is much branched; the leaves are bipinnated, and placed alternately upon the younger branches; the pinnæ are about two inches long, and from fifteen to thirty pairs, having small glands inserted between them; each wing has about forty pair of linear leaflets beset with short hairs: the spines are short, recurved, and placed in pairs at the base of each leaf; the flowers are hermaphrodite and male, and stand in close spikes which arise from the axillæ of the leaves, and are four or five inches long; the calyx is tubular, hairy, and divided at the limb into five oval pointed segments; the corolla is monopetalous, whitish, and of the same form as the calyx, but twice as long, The filaments are numerous, double the length of the corolla, crowned with roundish anthers, and adhering at the base to the germen, which is oval, and supports a slender style, terminated by a single stigma. The fruit is a lanceolate, compressed, smooth, brown pod, with an undulated thin margin, and contains six or eight roundish flattened seeds, which are nauseous when chewed.

The extract of catechu, formerly called *Terra Japonica*, and considered as of mineral origin, is imported from Bengal and Bombay; it is termed *cutch;* two varieties are found in the drug market; one in cubic pieces, of a pale reddish-brown colour, pulverulent, and of an astringent taste, accompanied by a slight sweetness; the other resinous, brown, and more astringent and bitter. In composition these varieties closely resemble each other, and consist, according to Davy, of—

	Bengal.	Bombay.
Tannin	48·5	54·5
Extractive	36·5	34·0
Gum	8·0	6·5
Earthy impurities	7·0	5·0
	100	100

Catechu is almost entirely soluble in water, and in proof spirit, and is one of the best vegetable astringents of the Materia Medica. It is the basis of the following formulæ of the Pharmacopœia:—

INFUSUM CATECHU COMPOSITUM.	COMPOUND INFUSION OF CATECHU.
℞ Catechu contriti, drachmas sex,	Take of Catechu, in powder, six drachms,
Cinnamomi contusi, drachmam,	Cinnamon bruised, a drachm,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horam, in vase levitèr clauso, et cola.	Macerate for an hour in a lightly-covered vessel, and strain.

TINCTURA CATECHU.	TINCTURE OF CATECHU.
℞ Catechu, uncias tres cum semisse,	Take of Catechu, in powder, three ounces and a-half,
Cinnamomi contusi, uncias duas cum semisse,	Cinnamon, bruised, two ounces and a-half,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

Catechu is available wherever astringents are indicated. In the treatment of common diarrhœa, connected with acidity in the stomach, after the administration of a rhubarb aperient, two or three table-spoonsful of the following mixture, or one of the annexed powders, will prove effective:—

℞ Misturæ Cretæ, f℥vss.
Tincturæ Catechu, fʒvj.
Misce.

℞ Pulv. Cretæ comp. cum Opio, ℈j.
Pulv. Catechu, gr. x.
Misce: fiat pulvis post singulas sedes liquidas sumendus.

In cases of relaxed uvula, and as a preventive of hoarseness arising from local relaxation, catechu lozenges, or an infusion of catechu used as a gargle, may be advantageously resorted to; the former are especially useful to public speakers, and singers, who often suck a morsel of catechu itself, for the purpose of clearing and strengthening the voice. Where the gums are spongy, Dr. Paris recommends the following as a tonic dentifrice:—

℞ Cinchonæ Lancifol. Pulv.
Catechu Extract. Pulv. āā ℥ss.
Pulv. Myrrhæ, ʒij. M.

Dr. Thomson states that the following ointment is in great repute in India, as an application to ulcers:—four ounces of powdered catechu, nine drachms of alum, four ounces of white resin, and ten ounces of olive oil, with a sufficient quantity of water. (*Lond. Disp.*)

CENTAURIUM. *Centaury* (from κενταυρος, *Centaur:* Chiron having cured wounds with it). *Erythræa Centaurium. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Gentianeæ.

This indigenous annual grows in dry soils, flowering in July and August. The root is yellowish, woody, and fibrous; the stalk erect, with few branches, smooth, angular, and about eight or ten inches high; the leaves are opposite, sessile, smooth, oblong, ribbed, obtusely pointed; the flowers are terminal, produced in a bunch, of a pink colour; the calyx is divided into five segments; the corolla is funnel-shaped, the tube cylindrical, longer than the calyx, and divided at the limb into five elliptical segments; the filaments are five, white, slender, shorter than the corolla, and furnished with yellow oblong anthers. The ovary is oblong, green, with a simple style, and clubbed stigma.

Centaury is inodorous, and bitter; the summits being, according to some, more bitter than the rest of the plant. It is an unnecessary incumbrance to the Materia Medica, being very rarely prescribed, and seldom found in the apothecaries' shops. It is a simple bitter, for which gentian may always be substituted. Its vermifuge qualities are imaginary.

CERA. Wax. (*Κηρος.*) *Concretum ab ape paratum.* A concrete prepared by the bee.

CERA ALBA. *Idem dealbatum.* White wax. The same bleached.

It appears from the experiments of Huber, that wax is produced by the bee, though its frequent occurrence as a vegetable principle seemed to render it probable that it was merely collected by that insect. When the honey-comb has been drained of honey, it is washed, melted in hot water, strained, and cast into cakes, forming *yellow wax.* English and foreign wax are found in the market, the latter being chiefly imported from the Baltic, the Levant, and the coast of Barbary.

Recent wax has a yellow colour, no taste, and a feeble honey-like odour. Its specific gravity is about 0·960. At low temperatures it is brittle, but acquires softness and tenacity when slightly warmed, and then admits of being kneaded without adhering to the fingers. It fuses between the temperatures of 140° and 150°; at a higher temperature it is converted into vapour, and may be distilled with little other change than the production of a small portion of stearic acid; at a red heat, its vapour burns in the contact of air with a bright white flame. According to Dr. Thomson (*Lond. Disp.*), yellow wax "is often adulterated with earth, pease-meal, resin, and tallow. Earth or pease-meal may be suspected when the cake is very brittle, and the colour inclines more to gray than bright pale yellow; they may be separated by melting and straining the wax. The presence of resin may be suspected when the fracture appears smooth and shining, instead of being granulated, and it may be detected by putting small pieces of the wax into cold alcohol, which will readily dissolve the resinous part, without acting on the real wax. Tallow is discovered by the greater softness and unctuosity of the cake, and its disagreeable suffocating smell when melted."

Bleached, or white wax, is generally adulterated with spermaceti, and is sold at different prices accordingly; in this case it is more opaque and softer than pure wax, and the surface of the cake has a peculiar mottled aspect; it is also more fusible than it should be, though, when pure, white wax is rather less fusible than yellow; it should not liquefy below 155°. Dr. Thomson states that white wax is sometimes adulterated with white oxide of lead, in order to increase its weight, with white tallow, and with potato-starch. "The first is detected by melting the wax in water, when the oxide falls to the bottom of the vessel. White wax is known to contain tallow, when it is of a dull opaque white, and wants the transparency which distinguishes pure wax; and starch is detected by adding to the suspected wax two per cent. of strong sulphuric acid, and then washing the mixture carefully; the acid carbonises the starch, without acting on the wax."

The adulteration of white wax at present most to be apprehended, and most difficult of detection, is with stearic acid, now so extensively used in the manufacture of candles.

Wax is insoluble in water; it is sparingly soluble in boiling alcohol and ether, and is deposited as the solutions cool. Twenty parts of absolute alcohol at its boiling-point dissolve about one part of bees' wax, of which about one-fifth only is retained at the temperature of 60°, and this is precipitated on dilution with water. Cold ether does not act upon wax, but boiling ether dissolves about one-tenth of its weight, and deposits nearly the whole on cooling. Wax readily unites by fusion with the fixed oils, and forms compounds of variable consistency, which are the basis of most ointments and cerates. Several of the volatile oils also dissolve wax when aided by heat. With the fixed alkalis, wax forms imperfect saponaceous compounds of difficult solubility, from which the acids separate it in an apparently unaltered state. At common temperatures, the acids scarcely act upon wax; hence the advantage of *wax-lute* for the retention of corrosive vapours. At the fusing-point, wax combines with sulphuric acid, and the solution congeals on cooling; hydrochloric acid has no action on it; nitric acid, after continued boiling, converts a portion of it into oxalic acid.

Bees' wax has been analysed by Gay Lussac, and by Ure, according to whom, the following are its ultimate components:—

	Gay Lussac.	Ure.
Carbon	81·784	80·60
Hydrogen	12·672	11·47
Oxygen	5·544	7·93
	100·000	100·00

There are many vegetables which secrete considerable quantities of wax; two of the most remarkable are the *Myrica cerifera*, or wax-myrtle, a native of Louisiana, and other parts of North America, the berries of which are covered by a waxy secretion; and the *Ceroxylon Andicola*, or wax-palm of South America, the stem and branches of which are encrusted with a compound of wax and resin.

Formerly, wax was occasionally administered internally, in various forms, as a remedy in dysentery, and in supposed ulceration of the intestines, an employment of it which has now properly fallen into disuse.

CERATA. Cerates. (From *Cera*, Wax.)

Cerates are unctuous preparations for external use, intermediate in consistency between plasters and ointments. They are mostly liable to become rancid by long keeping, and such should always be used recently prepared.

The simple cerate (CERATUM) of the Pharmacopœia, which is made by mixing four fluidounces of olive oil with four ounces of melted white wax, is a good vehicle for other applications, and when spread on lint or soft linen, is an inert cooling dressing.

The other *cerates* are elsewhere described; they are as follow:—

Ceratum Calaminæ, *see* CALAMINA.
Ceratum Cantharidis, *see* CANTHARIDES.
Ceratum Cetacei, *see* CETACEUM.
Ceratum Hydrargyri Compositum, *see* HYDRARGYRUM.
Ceratum Plumbi Acetatis, *see* PLUMBUM.
Ceratum Resinæ, *see* RESINA.
Ceratum Sabinæ, *see* SABINA.
Ceratum Saponis, *see* SAPO.

CEREVISIÆ FERMENTUM. The Yest of Beer. Barm.

The froth or scum which collects upon the surface of beer during the process of the fermentation of the wort is apparently derived from the albumino-glutinous parts of the grain, and is highly effective in promoting the vinous fermentation of saccharine liquors. It is generally used in its recent and moist state, but it preserves its qualities when carefully dried. It soon runs into putrefaction at common temperatures, absorbing oxygen, evolving carbonic acid, acquiring a fetid odour, and becoming sour from the formation of acetic acid. Its occasional bitterness is derived from the hop.

The *yest poultice* (see page 163) has already been adverted to; yest has also been administered internally as a tonic and antiseptic, but its virtues are of a very doubtful character.

CETACEUM (from *Cete*, a whale). Spermaceti. *Concretum in propriis capitis cellis repertum.* A concrete found in peculiar cells in the head of the spermaceti whale, *Physeter macrocephalus.*

This species of whale chiefly inhabits the Southern Ocean. Its average length is sixty feet, and at the thickest part of the head it is about thirty feet in circumference. The above-mentioned cells contain an oily fluid, which concretes on the death of the animal, and from which the liquid portion is drained off: the remainder constitutes *crude spermaceti*, of which an ordinary-sized whale yields about twelve barrels; it is purified by pressure in hair bags, and subsequent fusion in boiling water; it is then boiled in a weak ley of potash till it acquires its colourless and flaky character on cooling.

When thus purified, it has a lamellar crystalline fracture; is translucent, friable, unctuous, and of a slightly greasy odour and taste. Its specific gravity is 0·943. It fuses at 112°. It is insoluble in water, and only sparingly soluble in boiling alcohol. When purified from adhering oil by the action of alcohol it has been termed *cetin.* The following are the ultimate elements of cetin, spermaceti, and spermaceti oil, according to the analyses of Chevreul, Berard, and Ure.

	Cetin.	Spermaceti.	Spermaceti Oil.
Carbon	81·7	79·5	78·0
Hydrogen	12·8	11·6	11·8
Oxygen	5·5	8·9	10·2
	100·0	100·0	100·0

As an internal remedy, spermaceti is not more efficacious than the common fixed oils; it is occasionally administered in the dose of half a drachm to two scruples, rubbed down with the yolk of egg, especially to women in childbed. Its principal use is as an ingredient in ointments.

CETRARIA. *Cetraria Islandica.* Liverwort. Iceland Moss. *Cl.* 24. *Ord.* 5. Cryptogamia Algæ. *Nat. Ord.* Lichenaceæ.

This species of lichen is abundant in Iceland, and more or less common over the north of Europe; it grows two or three inches high; the frond is dry, coriaceous, lobed and notched; the surface smooth, shining, and blistered; the margins are beset with minute rigid hairs; the colour yellowish and grayish brown.

The active component parts of *Iceland moss* are a bitter matter, and a peculiar modification of mucilage. The former may be separated by digestion in cold water, or by boiling for a few minutes; then, by a continued decoction, the mucilage is extracted. These ingredients render Iceland moss somewhat tonic and nutritive; and when freed from its bitterness, it is used in Lapland as an article of food; it cannot, however, be admitted as having any pretensions as a specific in phthisis pulmonalis, though it may be a good palliative, as relates to the cough and diarrhœa. It has also been found serviceable in various cases of debility and emaciation.

The following, according to Berzelius, are the proximate components of this lichen:—

Bitter extractive	3·0
Lichen starch	44·6
Sugar	3·6
Gum	3·7
Yellow extractive	7·0
Green wax	1·5
Tartar, tartrate of lime, and a little phosphate of lime	1·4
Starchy fibre	35·2
Trace of gallic acid	——
	100·0

The following decoction is the only officinal form of Iceland moss; it is given in the dose of from one to three or four ounces daily, and is generally mixed with milk; it is, however, nauseously bitter. The lichen, previous to use, should be picked, to free it from other mosses with which it is generally mixed:—

DECOCTUM CETRARIÆ.	DECOCTION OF CETRARIA.
℞ Cetrariæ, drachmas quinque,	Take of Cetraria, five drachms,
Aquæ, octarium cum semisse;	Water, a pint and a half;
Decoque ad octarium, et cola.	Boil down to one pint, and strain.

CHIMAPHILA. Winter Green. Ground Holly. *Chimaphila corymbosa. Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Pyrolaceæ.

The *leaves* of this plant, the *Pyrola umbellata* of other Pharmacopœiæ, are officinal. The *Chimaphila corymbosa* is native in America, and is also found in several parts of Europe; it grows in moist shady places, preferring a sandy soil; it is about six or eight inches high, and flowers in June. Its root is long and creeping; its stems erect; its leaves alternate, irregularly whorled, subsessile, lanceolate, serrated, and of a coriaceous texture; they are deep-green on the upper, and pale-green on the under surface. The flowers are from three to five; the calyx persistent and five-parted; the corolla consists of five roundish, concave, spreading petals, white, tipped with red, and of an aromatic odour; the anthers are purple, bifurcate, and supported on awl-shaped filaments; the germen is green and globular, and covered by a viscid matter, supporting a sessile, thick, and persistent stigma. The seed-vessel is a five-angled roundish capsule, inclosing many seeds.

The leaves of this plant are astringent and bitter; they contain, according to Dr. Wolff, 18 per cent. of bitter extractive, 2·04 of resin, 1·38 of tannin, and 78·58 of woody fibre. Its medical virtues are tonic and diuretic; it has been successfully administered in ascites, in acute rheumatism, and in various intermittent disorders; it communicates a green tinge and slight odour to the urine, and is useful, according to Dr. Ive, in a variety of cases of gravel, and consequent strangury, and in hæmaturia. The American Indians regard it as of universal efficacy. It was first brought into notice in this country by Dr. Somerville (*Medico-Chirurgical Transactions*, vol. v.)

The best form for the administration of chimaphila is the decoction, which may be prescribed either alone, or in conjunction with other diuretics, and in the dose of one or two ounces. A strong tincture, in proof spirit, is also a useful form.

Decoctum Chimaphilæ.	Decoction of Chimaphila.
℞ Chimaphilæ, unciam,	Take of Chimaphila, an ounce,
Aquæ destillatæ, octarium cum semisse;	Distilled water, a pint and a half;
Decoque ad octarium, et cola.	Boil down to one pint, and strain.

CINCHONA CORDIFOLIA. *Heartleaved Cinchona. Yellow Bark.*—Cinchona Lancifolia. *Lanceleaved Cinchona. Pale Bark. Quill Bark.*—Cinchona Oblongifolia. *Oblong-leaved Cinchona. Red Bark. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Cinchonaceæ.

To these, several other species of cinchona might probably be added; and varieties not referable to the above frequently occur in trade; but it is well to limit the officinal species to those retained in the present Pharmacopœia, which are quite sufficient for medical use.

The derivation of the term *Cinchona* has been referred to the Countess del Chinchona, wife of a viceroy of Peru, who was cured of an intermittent fever by its use, and who introduced it into Europe, on her return to Spain in 1640. It is, however, more probably from *Kina*, or *Kinkina*, whence *Quinquina*, an American name applied to these barks. The above species of cinchona are natives of the central parts of America.

I. Cinchona Cordifolia, or *yellow bark*, is said to be the produce of the forests of Bolivia, in Upper Peru, and of the province of La Paz. It is exported from Lima and Buenos Ayres. The tree is found on the mountains of Loxa and Santa Fé de Bogota, growing under the fourth degree of north latitude, on heights between 900 and 1440 toises, flowering from May to September. "It is a spreading tree, rising on a single, erect, round stem, of no great thickness, and covered with a smooth bark, externally of a brownish-gray colour. The younger branches are quadrangular, smooth, leafy, sulcated, and tomentose; the leaves, which are about nine inches in length, are opposite, petiolate, spreading, of an oblong oval, cordate or egg-shaped, entire, shining on the upper surface, ribbed and pubescent on the under, with the petioles flat on one side and roundish on the other, about a thumb's length in breadth, and of a purple colour; but the leaves of this species vary even more than those of *lancifolia*. The flowers appear in large terminal leafy panicles, supported on long, compressed, tetragonous peduncles; the calyx is five-toothed, downy, and of a dull purple colour; the corolla internally tomentose; the tube of a diluted red colour; the limb shaggy, white above and purplish below, and the segments spreading, with reflected tips; the filaments are short, supporting linear anthers, bifid at the base, which reach as far as the upper part of the tube of the corolla. The germen is tomentose, and changes to an oblong narrow capsule, about an inch and a half in length, marked with ten striæ, of a reddish-brown colour, and crowned with the calyx."—(*Lond. Disp.*)

Several varieties of yellow bark occur in the trade, but that which is preferred is chiefly in flat pieces, of a bright yellow-brown colour, and free, or nearly free, from epidermis; its fracture is somewhat fibrous, and its bitter flavour more pure and intense than that of the other varieties. Sometimes it is in large rolled or quilled pieces, partially covered with a brown or grayish epidermis. It is easily powdered, and is then of a brighter hue. It is occasionally mixed with fragments of other barks. The flat, thickish pieces, free from epidermis, have been found most abundant in quinia, of which the best samples yield, upon an average, about two per cent. The decoction of this bark is of pale yellow-brown colour, and gradually deposits a sediment of the same tint. It reddens litmus paper, acquires a dingy greenish-blue colour on the addition of a solution of sulphate of iron, and affords a precipitate with acetate of lead, with tartarised antimony, and with solutions of gelatine, and of tannin. The substances said to be contained in yellow bark are kinic acid and quinia, an oily and a yellow colouring matter, tannin, kinate of lime, and woody fibre.

The preparations of yellow bark in the present Pharmacopœia are, a decoction, a tincture, and an extract; but the term *cinchona* is occasionally applied indiscriminately to the pale, as well as to the yellow bark (*see* Cinchona Lancifolia). Yellow bark is also the source of the Sulphate of Quinia (Quinæ Disulphas) of the Pharmacopœia.

Decoctum Cinchonæ Cordifoliæ.	Decoction of Heartleaved Cinchona (Yellow Bark).
℞ Cinchonæ Cordifoliæ contusæ, drachmas decem,	Take of Heartleaved Cinchona, bruised, ten drachms,
Aquæ destillatæ, octarium;	Distilled Water, a pint;
Coque per sextam horæ partem in vase levitèr clauso, et liquorem adhuc calentem cola.	Boil for ten minutes in a lightly-covered vessel, and strain the liquor while hot.

Tinctura Cinchonæ.	Tincture of Cinchona (Yellow Bark).
℞ Cinchonæ Cordifoliæ contritæ, uncias octo,	Take of Heartleaved Cinchona, in powder, eight ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

Extractum Cinchonæ Cordifoliæ.	Extract of Heartleaved Cinchona (Yellow Bark).
℞ Cinchonæ Cordifoliæ contusæ, uncias quindecim,	Take of Heartleaved Cinchona, bruised, fifteen ounces;
Aquæ destillatæ, congios quatuor;	Distilled Water, four gallons;
Decoque ex aquæ congio ad octarios sex, et liquorem adhuc calentem cola. Eodem modo corticem ex pari aquæ mensurâ quatèr decoque, et cola. Denique liquores omnes in unum mistos ad idoneam crassitudinem consume.	Boil down from a gallon of water to six pints, and strain the liquor whilst hot. In the same manner boil down the bark in an equal measure of water four times, and strain. Lastly, all the liquors being mixed, evaporate to a proper consistence.

Quinia.—The active principle of yellow bark is the alkaloid *quinia;* it is contained in the bark in combination with a peculiar acid, the kinic, or cinchonic acid, and apparently in the state of an acid salt.

Quinia may be obtained from bruised yellow bark, by boiling it repeatedly in water slightly acidulated by sulphuric acid, till the whole of the soluble matters are extracted; the residue is then pressed out, and the several decoctions mixed, and allowed to deposit; the clear portion is then decanted off, and slaked lime is added in slight excess; the precipitate which falls is to be collected, washed with cold water upon a filter or strainer, and carefully dried. When dry it is to be digested in repeated portions of boiling alcohol, till it yields no bitterness to that liquid; the alcoholic solutions yield quinia on evaporation; it may be to a great extent deprived of colour by filtering its alcoholic solution through well-burned charcoal. If sulphate of quinia is required, it may be dissolved by a gentle heat in dilute sulphuric acid, and the solution filtered and evaporated yields crystals of that salt. There are many modifications of the above process, by which quinia, and sulphate of quinia, are obtained; it may be conveniently precipitated, for instance, by ammonia instead of by lime, and the sulphate may be rendered colourless by animal charcoal. The following is the formula of the *London Pharmacopœia* for the preparation of sulphate of quinia; the object which it is probably intended to attain, is the exclusion of the use of alcohol; but the employment of oxide of lead appears to me to be objectionable; the directions are not very clear, and in two attempts to follow them, I have failed in obtaining a satisfactory result. The truth is, however, that the introduction of a formula for the preparation of this important remedy is unnecessary; it never can be prepared upon a small scale for the purposes of pharmacy, and it comes into the market from the wholesale manufacturers in a state of extreme purity. It should therefore have had a place in the Materia Medica of the Pharmacopœia, and explicit directions should have been superadded for determining its uniform composition and freedom from adulterations. Quinia itself, which is never to be found in commerce, is placed in the list of the Materia Medica; if ever required, a simple formula might have been given for its preparation, which consists in decomposing a solution of sulphate of quinia by ammonia, and edulcorating and drying the precipitate.

QUINÆ DISULPHAS.

℞ Cinchonæ Cordifoliæ contusæ, libras septem,
Acidi Sulphurici, uncias novem,
Carbonis Animalis purificati, uncias duas,
Plumbi Oxydi hydrati,
Liquoris Ammoniæ,
Aquæ destillatæ, singulorum quantum satis sit;

Acidi sulphurici uncias quatuor et drachmas duas aquæ destillatæ congiis sex misce, iisque cinchonam adjice; coque per horam et cola. Quod restat, paritèr acido et aquâ, eâdem ratione mixtis, coque per horam iterumque cola. Denique cinchonam ex aquæ destillatæ congiis octo per horas tres decoque et cola. Quod restat, aquâ destillatâ fervente sæpiùs renovatâ, lava. Liquoribus commixtis plumbi oxydum adhuc humidum adde, usque ad saturationem. Liquorem supernatantem effunde et quod demissum est aquâ destillatâ lava. Decoque liquores, in quartam horæ partem, et cola: tum liquorem ammoniæ gradatim adjice ad quinam dejiciendam. Hanc lava donec nihil alkalini percipiendum sit. Quod restat acido sulphurico reliquo diluto saturetur. Postremò cum carbonis animalis unciis duabus digere, et cola. Denique, carbone omni eloto, cautè liquorem consume, ut prodeant crystalli.

DISULPHATE OF QUINIA.

Take of Heartleaved Cinchona, bruised, seven pounds,
Sulphuric Acid, nine ounces,
Purified Animal Charcoal, two ounces,
Hydrated Oxide of Lead,
Solution of Ammonia,
Distilled Water, of each as much as may be sufficient;

Mix four ounces and two drachms of the sulphuric acid with six gallons of distilled water, and to these add the cinchona; boil for an hour and strain. Likewise boil what remains in a similar mixture of acid and water for an hour, and again strain. Lastly, boil the cinchona for three hours in eight gallons of distilled water, and strain. Wash the residue frequently in fresh portions of boiling distilled water. To the mixed liquors add oxide of lead, still moist, up to saturation. Pour off the supernatant liquor, and wash the deposit with distilled water. Boil the liquors for a quarter of an hour, and strain; then gradually add solution of ammonia to throw down the quinia. Wash this until nothing alkaline is perceptible. Let what remains be saturated by the remainder of the sulphuric acid diluted; afterwards digest with two ounces of animal charcoal, and strain. Lastly, the charcoal being thoroughly washed, cautiously evaporate the liquor, that crystals may be produced.

We then find, in the preliminary *Notes* to the *Pharmacopœia*, the following further observations in reference to these subjects.

QUINA. Alkali ex Cinchonæ Cordifoliæ cortice paratum. In aquâ non nisi acido mixtâ, facillimè autem in alcohole liquatur. Curcumæ colorem mutat; amarum sapit. In igne tota perit.

QUINÆ DISULPHAS (*crystalli*). In aquâ, præsertìm acido mixtâ, tota liquatur. Ammoniâ dejicitur quina, tum liquore consumpto, quod superest, non saccharum sapere debet. Quinæ disulphas teni calore è 100 sui partibus 8 vel 10 aquæ impertit. In igne tota perit. Primùm chlorinio, deinde ammoniâ additis, viret.

QUINIA. The alkali prepared from Heartleaved Cinchona. It is not soluble in water, unless mixed with acid, but very easily in alcohol. It changes the colour of turmeric, and tastes bitter. It entirely consumes in the fire.

DISULPHATE OF QUINIA (*crystals*). It is entirely soluble in water, especially mixed with acid. The quinia is thrown down by ammonia; then on evaporating what remains, it ought not to taste of sugar. Disulphate of quinia by a gentle heat loses from 8 to 10 parts in the 100, of water. It is entirely consumed in the fire. When chlorine is first added, and then ammonia, it becomes green.

I have endeavoured to translate the preceding formulæ and notes as literally as possible, and shall now add Mr. Phillips' remarks as given in his translation of the Pharmacopœia:—"The different varieties of cinchona contain two vegetable alkalis, quina and cinchona; the *Cinchona Cordifolia*, or yellow bark, contains chiefly the former; the *Cinchona Lancifolia*, or pale bark, the latter; and the *Cinchona Oblongifolia*, or red bark, yields both of them. The quina exists in combination with a peculiar acid called kinic acid, forming with it kinate of quina, which is soluble to a certain extent in water, and is rendered more so by the sulphuric acid employed in the process, and perhaps by decomposing it. Whatever may be the state of combination, the solution contains sulphuric acid, kinic acid, and quina, mixed with extractive and colouring matter, the latter being got rid of by the animal charcoal. On adding oxide of lead, the sulphuric acid combines with it, and the resulting sulphate being insoluble, is precipitated, while the kinic acid and quina remain in solution; when ammonia is added after the separation of the sulphate of lead, the kinic acid unites with it, and the kinate of ammonia formed is soluble, while the quina is precipitated, and this, when afterwards combined with sulphuric acid, forms disulphate of quina, which crystallises.

$$\underbrace{\begin{array}{c}\text{"Sulphuric Acid.}\\ \text{Oxide of Lead.}\end{array}}_{\textit{Sulphate of Lead.}} \qquad \underbrace{\begin{array}{c}\text{Kinic Acid.}\\ \text{Ammonia.}\end{array}}_{\textit{Kinate of Ammonia.}} \qquad \underbrace{\begin{array}{c}\text{Quina.}\\ \text{Sulphuric Acid.}\end{array}}_{\textit{Sulphate of Quina."}}$$

Properties and composition of Quinia, and its Sulphates.—*Quinia* is best obtained by the decomposition of sulphate of quinia by ammonia; it falls in white flakes, which, when washed with cold water, and dried carefully on bibulous paper, are soft and pulverulent; it is difficultly crystallisable; when heated it fuses, loses a little water, and concretes on cooling into a resin-like mass. It restores the blue of reddened litmus, tastes intensely and purely bitter, is very sparingly soluble even in boiling water, readily soluble in boiling alcohol and in ether, and forms distinct salts with the acids. When gradually heated in a glass tube to redness, it fuses, becomes viscid and dark-coloured, yields ammoniacal and hydrocyanic vapours, and empyreumatic oil, and leaves a bulky charcoal. It consists of—

	Atoms.	Equivalents.	Per Cent.
Carbon	20	120	74·1
Hydrogen	12	12	7·4
Oxygen	2	16	9·9
Nitrogen	1	14	8·6
Anhydrous Quinia	1	162	100·0

Disulphate of Quinia (prepared as above described) forms acicular crystals, soluble in about 740 parts of cold, and 30 of boiling, water. They are soluble in about 30 parts of cold alcohol (sp. gr. 850), and much more soluble in boiling alcohol. This salt fuses when heated, and burns in the air, producing a copious charcoal, which may be consumed without residue. It becomes phosphorescent and electric when gently heated. When triturated with dilute sulphuric acid, it forms a white magma, which afterwards dissolves in water, and yields prismatic crystals of a neutral sulphate, which is more soluble than the disulphate, and somewhat efflorescent in dry air. When the disulphate of quinia is recently crystallised, and has not been exposed to air, its crystals include 8 atoms of water; when it has perfectly effloresced in a dry and warm atmosphere, or when it has been exposed to a temperature of 212° till it ceases to lose weight, 4 atoms of its water of crystallisation are evolved; when dried at a temperature of 240°, it only retains 2 atoms of water, which, according to Baup, may be expelled at a somewhat higher temperature, so as to leave an anhydrous salt, but which, according to Liebig, are retained till the salt decomposes. The disulphate of quinia of commerce has usually suffered a partial efflorescence, and contains water of crystallisation intermediate between 4 and 8 atoms.

	Atoms.	Equivalents.	Per Cent.
Quinia	2	324	89
Sulphuric acid	1	40	11
Anhydrous disulphate of quinia	1	364	100

	Atoms.	Equivalents.	Per Cent.
Quinia	2	324	74·3
Sulphuric acid	1	40	9·2
Water	8	72	16·5
Crystallised disulphate of quinia	1	436	100·0

II. Cinchona Lancifolia, or *lance-leaved cinchona*, generally termed *pale*, *quilled*, and *crown* bark, is the variety which, previous to the discovery of the alkaloids, was most esteemed, especially in the cure of intermittents; it is now almost entirely superseded as a remedial agent by sulphate of quinia.

The *Cinchona lancifolia*, which furnishes the pale Peruvian bark, is a handsome, lofty, erect tree, from thirty to forty-five feet high, and from one to four feet diameter; it generally stands single; when wounded it yields a yellow astringent juice; it has a cracked cineritious bark; the leaves are shining, ovate-lanceolate, about four inches long, and stand on footstalks about one-sixth their length; the stipules are two, acute, silky, contiguous, and caducous. The flowers are whitish-red, and odorous, and appear in terminal, brachiated, leafy, panicles, supported on round peduncles and pedicels; the calyx is bell-shaped, five-toothed, with the teeth short, acute, and contiguous; the corolla is funnel-shaped, consisting of a long cylindrical tube, divided at the limb into five segments, which are ovate or oblong, spreading, on the upper side red, on the under woolly, and fringed at the edges; the five filaments are bristly, placed in the middle of the tube, and furnished with oblong anthers, twisted spirally; the germen is ovate; the style is filiform, somewhat longer than the stamina, and furnished with a round stigma; the capsule divides into two parts, the cells of which are separated by a parallel partition; the seeds are small and numerous.

This bark is imported in cases or chests of about 200lb. weight each, chiefly in rolled up pieces, or quills, of various dimensions, mixed with larger, coarser, and flatter pieces; these differences apparently depend upon the part of the tree from which it has been taken. In trade these varieties are found in sorts; the small, fine, and clean quills being considered as most select, bear the highest price, and are called *crown bark*.

The larger quills form another commercial variety; the flat, coarse, and broken pieces are the least esteemed, and sold at an inferior price.

This species of cinchona is generally covered with a gray epidermis, having numerous transverse fissures, and more or less coarse according to the size of the quills. It is also generally abundant in lichens. Internally it is of a deep cinnamon, or fawn colour. Its odour, when fresh, and in large parcels, is peculiar, and slightly sour and aromatic: it should be perfectly free from all taint of mustiness. Its fracture is dense and somewhat fibrous; its taste faintly acid, astringent, and bitter. The decoction of this kind of bark is reddish-brown, and transparent while hot, but on cooling it acquires a much paler and yellowish colour, becomes turbid, and deposits a copious brown sediment.

According to Dr. A. T. Thomson, the following characters belong to select samples of this bark: "Water at 212° extracted all its active principles, affording an infusion which, when filtered, was of a pale yellow or straw colour, and had the odour and taste of the bark. The infusion reddened litmus paper; was instantly and copiously precipitated by solution of galls; and in a smaller degree and more slowly by solution of isinglass. A solution of tartar-emetic was rendered turbid and slowly precipitated by it; this effect was quickly and copiously produced by a solution of acetate of lead. Sulphate of iron changes its colour to bright olive-green, but is scarcely precipitated. Decoction afforded a more saturated solution, with a colour resembling the cold infusion of yellow bark, and a yellowish precipitate was deposited. The powder, macerated in sulphuric ether, afforded a golden-yellow tincture, which reddened litmus paper, and left a pellicle of bitter resin when it was evaporated on the surface of water, to which it gave the colour of the tincture. This coloured water had the flavour of the watery infusion, but differed from it in not precipitating the infusion of galls, nor the solution of tartar-emetic, and in throwing down a copious precipitate from the solution of sulphate of iron. With alcohol, the powder afforded a tincture of a deep orange hue, which precipitated sulphate of iron, tartar-emetic, and infusion of galls; became turbid when added to water, and let fall a light reddish precipitate."

The following are the formulæ of the present *London Pharmacopœia*, which include this species of cinchona:—

DECOCTUM CINCHONÆ LANCIFOLIÆ.	DECOCTION OF LANCELEAVED CINCHONA.
℞ Cinchonæ Lancifoliæ contusæ, drachmas decem,	Take of Lanceleaved Cinchona, bruised, ten drachms,
Aquæ destillatæ, octarium;	Distilled Water, a pint;
Coque per sextam horæ partem in vase levitèr clauso, et liquorem adhuc calentem cola.	Boil for ten minutes in a lightly-covered vessel, and strain the liquor whilst hot.
INFUSUM CINCHONÆ.	INFUSION OF (LANCELEAVED) CINCHONA.
℞ Cinchonæ Lancifoliæ contusæ, unciam,	Take of Lanceleaved Cinchona, bruised, an ounce,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas sex, in vase levitèr clauso, et cola.	Macerate for six hours in a lightly-covered vessel, and strain.

Tinctura Cinchonæ Composita.	Compound Tincture of (Lanceleaved) Cinchona.
℞ Cinchonæ Lancifoliæ contritæ, uncias quatuor,	Take of Lance-leaved Cinchona, bruised, four ounces,
Aurantii Corticis exsiccati, uncias tres,	Orange-peel, dried, three ounces,
Serpentariæ contusæ, drachmas sex,	Serpentaria, bruised, six drachms,
Croci, drachmas duas,	Saffron, two drachms,
Cocci contriti, drachmam,	Cochineal, powdered, a drachm,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

Extractum Cinchonæ Lancifoliæ.	Extract of Lanceleaved Cinchona
Eodem modo preparatur quo extractum Cinchonæ Cordifoliæ.	Is prepared in the same manner as extract of Heartleaved Cinchona.

The active principle of lanceleaved cinchona is the alkaloid *cinchonia;* it may be obtained by boiling the bark in water acidulated by sulphuric acid, precipitating by lime, drying the precipitate and digesting in alcohol, as above stated in regard to yellow bark. The cinchonia appears to be contained in the bark in combination chiefly with the kinic (or cinchonic) acid. It forms colourless prismatic crystals, almost insoluble in cold water, and very sparingly soluble in boiling water. They are slightly bitter, but acquire intense bitterness when a little acid is present. They restore the blue colour to reddened litmus; they are sparingly soluble in cold alcohol, ether, and fixed oils, but abundantly soluble in boiling absolute alcohol, and the solution deposits crystals on cooling, and becomes milky when dropped into water. Cinchonia is composed of—

	Atoms.	Equivalents.	Per Cent.
Carbon	20	120	78·4
Hydrogen	11	11	7·2
Oxygen	1	8	5·2
Nitrogen	1	14	9·2
Cinchonia	1	153	100·0

Neither cinchonia, nor its salts, are much used in medicine, in consequence of the comparative cheapness, and as it is said greater efficacy, of quinia and its salts. The salts of cinchonia are crystallisable, and in many respects, as regards the action of reagents, they resemble the salts of quinia.

III. Cinchona Oblongifolia. *Oblong-leaved Cinchona.* This species of cinchona furnishes the *Red Bark.* It is a lofty tree, covered with brown, smooth bark; the leaves are large, entire, pale and glossy upon the upper surface, and veined beneath; they are oblong, oval, and supported on flat petioles, the stipulas are supra-axillary, opposite, contiguous, united at the base, and of an obovate figure; the flowers are in large, erect, compound, terminal panicles, on long, many-flowered peduncles; the calyx is purple, small, and five-toothed; the corolla white, with the limb spreading and hairy within; the filaments, which are very short, are inserted into the tube of the corolla, and support oblong anthers, bifid at the base. The capsules are large, oblong, slightly striated, and curved, and crowned by the calyx.

Red bark occurs in commerce in flat and quilled pieces, covered with a reddish-brown epidermis, and internally of a fibrous texture, and a rusty red tint. It tastes more astringent but less bitter than the yellow bark, and has not the peculiar aromatic austerity of pale bark. It contains both cinchonia and quinia. It is brought from Peru in chests, which contain from 100 to 150lbs. each. Its powder is of a dull, brownish-red tint, and has a peculiar earthy odour. "Its aqueous infusion is red, astringent, and only slightly bitter. It reddens litmus, and is slowly precipitated by solution of galls, the supernatant liquor being colourless. A very light flocculent precipitate is produced by solution of gelatin. It is scarcely altered by tartarised antimony; more so by acetate of lead; the proto-sulphate of iron makes it assume a deep olive-green colour, but little is precipitated. The etherial tincture is of the same colour, and exhibits the same appearances as the former species when similarly treated. The alcoholic tincture is of a very deep brownish-red colour; when diluted with water, a red flocculent matter falls down, and it precipitates the solution of sulphate of iron and of tartarised antimony, the former of a black colour, and the latter red."—(THOMSON'S *Lond. Disp.*)

The activity of red bark is referable to the presence both of quinia and cinchonia, the former alkaloid being in the largest relative proportion; they are combined, as in the other barks, with cinchonic acid.

The officinal preparations of red bark in the present *London Pharmacopœia*, are, a *decoction* and an *extract*, which are directed to be prepared in the same manner as the corresponding preparations of yellow bark.

Medical Properties and Uses of the different species of Cinchona, and of the Sulphate of Quinia.—The discovery of the active principles or alkaloids contained in the three varieties of cinchona above described, has thrown an entire new light upon their medical applications, and led to new and more effective methods of administering them. Cinchona is either employed as a general, or as a specific tonic; in the former case, it is useful in all diseases of direct or indirect debility, as a strengthener and restorative, and the pale, or lanceleaved variety, is often preferable to the others; in the latter case, it is chiefly used in consequence of its peculiar and specific action in intermittent diseases, and more especially in agues and other intermittent or remittent febrile disorders. It has of late been the custom to substitute sulphate of quinia for the other preparations of bark, but where its virtues as a general tonic are required, and where it is not administered merely or principally as an antiperiodic, the infusions and decoctions of the pale and of yellow bark, and more especially the former, are often preferable to the sulphate of quinia; partly, perhaps, in consequence of the other proximate principles that are present, and partly from the nature of the salt of cinchonia, or of quinia, which exists in the original bark; indeed, the salts of quinia, and cinchonia, with vegetable acids, seem to deserve more notice than they have hitherto obtained from medical practitioners.

As a tonic in idiopathic debility, or as a restorative after depletion, the decoction, infusion, and extract of bark, are properly resorted to, and the pale, or lanceleaved variety, is in many instances more effective and more agreeable to the stomach than the yellow bark. There is a manifest objection to the use of powdered bark, which is, the large relative quantity of inert woody fibre with which the stomach is unnecessarily encumbered, for the soluble matter of the finest and freshest cinchonas does not exceed 40 per cent.

The following analysis will furnish some idea of the components of this bark; but the quantity of soluble matter seems to be underrated:—

Acid cinchonate of cinchonia	1·54
Green fatty matter	0·79
Resin	2·18
Red extractive	9·09
Tannin	5·00
Gum	4·40
Lime combined with cinchonic acid	1·40
Woody fibre	75·69
	100

Yet, *powdered bark* must not be rejected, for cases are not unfrequent in which it is highly effective, and in which the tardiness of its action, and its protracted tonic power in the stomach and bowels, render it peculiarly available. It frequently acts as a mild aperient, and sometimes purges, in which case small doses of opium, if not otherwise contraindicated, may be combined with it; if it constipate, the bowels must be kept open by laxative adjuncts, and great care must always be taken to avoid the accumulation of its inert and insoluble parts in the large intestines. The usual dose of powdered pale bark is half a drachm three or four times a day, and of powdered yellow bark somewhat less; red bark is scarcely used. Where a very mild tonic is required, the infusions either of the yellow or pale bark, as above directed, may be used, and they may be made the vehicles of small doses of the powder, and combined with the tincture, or strengthened by the addition of the extract, or of sulphate of quinia. Two ounces of bruised bark to a pint of water, is a good proportion. A sense of weight at the stomach, slight nausea, and headache, and other similar symptoms, are frequent attendants upon the use of cinchona; they generally arise from giving it in too large doses; but it is often rendered more agreeable to the stomach by the addition of aromatics, such as cloves, or orange-peel, or cinnamon; and sometimes a few drops of dilute sulphuric acid will not only relieve nauseation, but sharpen the appetite, and promote the tonic powers of the remedy.

The *extract of bark*, when carefully prepared, is a valuable and effective medicine; its desiccation should be cautiously performed at a temperature not exceeding 212°, and it should be so far dried as to be pulverisable. The average produce of dry watery extract from good lance-leaved bark is 30 per cent.; and of alcoholic, or, as it was formerly called, of *resinous* extract, about 24 per cent; the latter preparation is, however, obsolete. From two or three, to eight or ten grains of the extract of bark, may be given either in the form of a pill, or dissolved in the infusion or decoction, or in the compound infusion of roses of the Pharmacopœia. Dissolved in syrup of mulberries, or of orange-peel, it affords a good form for the administration of bark to children, when, as is usually the case, they refuse the other forms of this remedy.

> ℞ Extracti Cinchonæ Lancif., ʒij.
> Solve in Syrupi aurantii, f℥ij. Capiatur cochleare unum minim (fʒj.) pro dosi, secundâ vel tertiâ quâque horâ.

The above are the most effective forms of cinchona in cases of continued fevers, and more especially in those which assume the putrid type; but its exhibition requires precaution, and in pure and mixed typhus it can seldom be safely administered in effective doses whilst the skin is hot and dry, or until the increased excitement has been to a great extent subdued. In putrid sore throat, scarlatina, measles, and small-pox, bark often proves an admirable remedy, especially when combined with such adjuncts or other plans of treatment as the peculiarities of individual cases may require.

Much has lately been said respecting the free use of bark in acute rheumatism, after the bowels have been freely evacuated by antimonial purges. Dr. A. T. Thomson says that its efficacy in this disease is much increased by the addition of spirit of turpentine; but he observes that it can only be depended upon after calomel, emetic tartar, colchicum, and opium, have been liberally exhibited, and when the pain has partially abated, or assumed an intermittent character, and the pulse has become softer.

"Bark," says Dr. Gregory (*Elements of the Theory and Practice of Physic*), "was introduced as a remedy in acute rheumatism with the highest encomiums, by Dr. George Fordyce and Dr. Haygarth; but, as far as my observation extends, it has not answered the expectations which might have been formed of it from the testimony of those authors. It has appeared to me to be of use only in the latter periods of the disease, when considerable pain and stiffness of the joints are frequently found to exist, but with a *natural* state of the pulse and tongue."

There are many forms of chronic rheumatism in which bark may be properly prescribed, more especially those common and obstinate forms of the complaint which occur in debilitated constitutions. In certain cases of gout, also, the efficacy of this remedy is similarly obvious.

In phthisis pulmonalis, bark, if given in sufficient doses to produce any decided effect, should be very cautiously administered. Dr. A. T. Thomson's remark upon its use in this disease is correct and valuable:—"Bark is found beneficial," he says, "when the accompanying hectic puts on more of the intermittent form than usual, when the debility is considerable, and blood is mixed in the sputa: and in several cases of pneumonia, when, after repeated and large bleedings and evacuations, the pulse continued hard and thrilling, and the blood buffy, although the expectoration was free and the skin open, we have seen bark produce the happiest effects." (*Lond. Disp.*)

If, however, we were to enumerate all the cases in which the eminent tonic powers of cinchona are available, or to mention the different disorders in which, at one period or other, it has been, and may probably be administered, we should go through nearly the whole catalogue of human maladies; it is certainly one of the most valuable tonics that can be resorted to in all cases of general debility of constitution, from whatever cause they may proceed; and the greatest advantage is derived from it by convalescents generally, even after inflammatory diseases, where copious bleeding has been necessarily resorted to. But it is in the treatment of intermittent fever, and in that of a variety of intermitting and remitting complaints, that cinchona claims especial attention as a *specific;* and though it occasionally fails, even in cases which yield to other tonics (more especially those of mineral origin), its remedial powers are universally admitted as pre-eminent in these forms of disease. It has sometimes been asserted that the curative powers of cinchona are those of a simple bitter, and that several indigenous medicines of that class are equally effective; but the discovery of quinia and cinchonia, and of their specific action in the cure of intermittents, has shown that the claims of cinchona are of a distinct character.

Some doubts have arisen as to the best and proper time for the use of bark in cases of ague, namely, whether it is properly or preferably administered during the febrile excitement, or whether it should be exclusively employed as a preventive, during the intermission. Experience seems to have settled this question, and to have decided in favour of its use during the period of apyrexia; in the intervals that is, instead of during the paroxysm. It requires to be used in adequate doses, and should be given at the shortest intervals immediately before the expected attack, much depending upon the quantity administered in a given time.

It may be considered as proved, that the cinchonia and quinia, or their combinations with the peculiar acid of the bark, are the agents upon which efficacy depends, and quinia appears more certain and active than cinchonia, and of this alkaloid the sulphate is an active and unobjectionable form; and as in it the febrifuge powers of cinchona appear to be concentrated, it furnishes an admirable means of introducing the equivalent of large quantities of bark into the system, in a form which is less apt than any other to derange the digestive organs. The dose, however, which will produce the desired effect, is in all cases uncertain; practitioners generally perhaps err in giving it in too large quantities, especially at first; it produces nausea, headache, a peculiar sense of weight and uneasiness at the stomach, thirst, and a dry white tongue; smaller doses, if necessary more frequently repeated, obviate these ill consequences. From one to three grains of the ordinary sulphate (disulphate) of quinia every two or three hours, during the apyrexial period of an intermittent, is an average and adequate dose; much larger quantities have been given, but usually with mischievous consequences.

Acidulated infusion of bark, or infusion of roses, are good vehicles; or it may be made into pills with conserve of roses. The previous clearance of the bowels by a calomel purge, and of the stomach, if requisite, by an emetic, generally renders the tonic treatment more certain and effective. When given during the paroxysm, any form of bark adds to the nausea and general uneasiness, and nothing appears to be gained by commencing the tonic, as some have advised, during, or immediately after, the hot stage.

In all intermittent diseases, pale and yellow bark, and their preparations, but more especially the sulphate of quinia, are indicated, and are often highly effective. "It is efficacious in dysentery and diarrhœa, when they become intermittent; in chorea, epilepsy, some coughs, and rheumatism; indeed, I have long regarded it as a maxim, that wherever intermission clearly takes place, there cinchona or its preparations will prove useful; but it does not prevent the continuance of those paroxysms of ague which form one of the constitutional symptoms of stricture of the urethra, and some other local affections, and which can be cured only by removing the strictures and other sources of irritation. The yellow bark possesess the most powerful antiperiodic powers." (THOMSON's *Lond. Disp.*)

Great benefit is also derived from the use of cinchona in the treatment of remittent fevers; but in those cases the concomitant symptoms must be carefully considered, the bowels kept open, the skin moist, and general or local excitement previously subdued by the lancet. In these, and indeed in the former cases also, and in continued fevers of the typhoid character, the efficacy of bark is materially promoted by combining it with diffusible stimuli, and with proper doses of opium; among the former, wine, brandy, aromatic and etherial tinctures, and carbonate of ammonia, may be especially named.

There are many local complaints in which cinchona, upon the principles already adverted to, is eminently useful; such are some eruptive diseases, ulcers, certain forms of dyspepsia, and painful nervous affections; and as a topical application it furnishes, in the form of decoction, a good gargle in various forms of sore throat, in relaxed uvula, and in aphthous affections, and may be used as a lotion for fetid and gangrenous sores, or as an ingredient in poultices. Some practitioners have advocated the external application of cinchona in cases of marasmus and extreme debility, and atrophy, and have even directed powdered bark to be sewn up in muslin bags, and extensively applied to the surface of the body; but this treatment is worse than ineffectual.

The following are some of the ordinary forms in which cinchona and its preparations are administered, and in which the pale and the yellow bark may occasionally replace each other.

℞ Extract. Cinchon. Lancifol. gr. v.
Solve in Decocti Cinchonæ Lancifol. f℥iss. et adde
Syrupi Aurantii,
Tinct. Cinchon. comp. āā fʒss.
Misce; fiat haustus bis vel ter die sumendus.

℞ Decoct. Cinchon. Cordifol. ʒx.
Acid. Sulphurici diluti, ♏v.
Syrupi Aurantii,
Tinctur. Cardamomi, āā fʒj.
Misce; fiat haustus, quartis vel sextis horis repetendus.

℞ Decoct. Cinchon. Cordifol. ʒx.
Confect. Aromat. ℈j.
Pulver. Cinchonæ, gr. x.
Spiritus Cinnam. fʒss.
Misce; fiat haustus.

℞ Decoct. Cinchonæ Lancifol.
Infus. Rosæ C. āā f℥iijss.
Acid. Hydrochlorici, ♏x.
Syrupi Mori,
Tinct. Cardam. comp. āā ℥ss.
Misce; fiat mistura. Cochl. iij. ampl. pro dosi.

℞ Decoct. Cinchonæ (Cordifol. aut Lancifol.) f℥vss.
Extract. Cinchonæ (C. vel L.) ʒj.
Tincturæ Cinnamomi,
Syrupi Zingiberis, āā fʒij.
Misce. Cochlearia duo vel tria bis vel ter in dies sumenda.

℞ Decoct. Cinchonæ, f℥vij.
Pulv. Cinchonæ,
Confect. Aromat. āā ʒj.
Ammoniæ Sesquicarbon. ʒss.
Tinctur. Cinchon. comp. ℥j.
M. Sumantur cochlearia tria ampla pro dosi.

℞ Quinæ disulphatis, ʒss.
Conservæ Ros. Gall. q. s.
Ut fiat pilul. xv.
Sumatur una secundâ vel tertiâ quâque horâ.

℞ Quinæ disulphatis, ℈j.
Extract. Cinchon. Lancifol. ʒj.
Misce optime et divide in pilulas xx quarum sumatur una bis vel ter die.

℞ Quinæ disulphatis, grana ij.
Acid. Sulphurici diluti, ♏iij.
Syrupi Croci, fʒss.
Aquæ destill. f℥j.
Misce; fiat haustus.

℞ Infusi Cinchonæ, fʒxj.
Quinæ disulphatis, gr. j.
Tinctur. Cinchonæ compos.
Syrupi Papaveris, āā fʒss.
Misce; fiat haustus.

℞ Decocti Cinchonæ,
Infusi Rosæ compos. āā f℥iijss.
Mellis Rosæ, f℥j.
Tincturæ Myrrhæ, fʒij.
Acid. Hydrochlorici, ♏x.
M. fiat gargarisma.

CINNAMOMUM. *Cortex.* CINNAMOMI OLEUM. *Oleum e cortice destillatum.* The *bark*, and the *oil distilled from the bark*, of the Cinnamon Laurel, *Laurus cinnamomum. Cl.* 9. *Ord.* 1. Enneandria Monogynia. *Nat. Ord.* Lauraceæ.

This species of Laurus is a native of Ceylon; it attains a height of about twenty feet, the trunk extending about six feet in length, and a foot and a-half in diameter, sending off numerous branches covered with a smooth bark; the leaves stand in opposite pairs upon short footstalks; they are ovate-oblong, obtusely pointed, entire, firm, from three to five inches long, bright green, and marked with three longitudinal nerves; the common peduncles grow from the younger branches, and, after dividing, produce the flowers in a paniculated umbel; the petals are six, oval, pointed, concave, spreading, of a yellowish colour, the three outermost broader than the others; the nine filaments are shorter than the corolla, flattish, erect, standing in ternaries, and at the base of each of the three innermost are two small glands; the anthers are double, and unite over the top of the filament; the germen is oblong, the style simple, of the length of the stamina, and the stigma triangular and depressed; the fruit resembles a small olive; it is of a blue colour, inserted in the corolla, and contains an oblong nut.

Several varieties of the cinnamon tree were formerly resorted to as sources of the bark, but the following four as those which are said to yield the bark which is now found in the market:—1. The finest is the

Sweet, or *Royal Cinnamon*. 2. *Snake Cinnamon*, which closely resembles the first. 3. *Camphor Cinnamon*. This species contains camphor, especially in the root, and the bark and leaves have a camphorated odour. 4. *Astringent Cinnamon*.

The excellence of cinnamon depends probably upon the species whence the bark is derived, and upon the age of the tree; but it is an article the purchase of which requires much circumspection, for a large proportion of that which is found in the London market is insipid, or nearly so, and being often rolled up in the interior of the better kinds, is not easily detected except by tasting, and carefully examining each individual stick. In collecting this bark, the strips are peeled off longitudinally, and bound up in bundles which soon become hot from incipient fermentation, and are then scraped so as to remove the epidermis and the green pulpy matter beneath it; it is then dried, the smaller pieces being folded in the larger, and is tied up in bundles of about thirty pounds weight each. It is then carefully inspected and sorted by government officers, and divided into three sorts or qualities; the bark of the medium-sized branches is preferred; that of the old and large branches has a rough pungent taste, and a dark or reddish-brown hue; and the bark of the very young and small branches is of a light colour, and nearly tasteless. The second kind is said to be often sold under the name of *Cassia*.

The best cinnamon is brought from Ceylon in bales or bags, made of the cloth of cocoa-nut bark, and weighing from ninety to one hundred pounds each. It should be nearly as thin as paper, of a yellow-brown colour, and splintery fracture, and it should readily yield its warm and sweet aromatic pungency when chewed. The Chinese cinnamon is of a very inferior character, and more resembles cassia. The cinnamon laurel also thrives in Malabar, Sumatra, and the eastern islands, and has been cultivated in the Brazils and elsewhere, but the supply of choice cinnamon-bark is exclusively from Ceylon. When mixed with cassia-bark, the adulteration may be detected, according to Dr. Thomson, by the effect of tincture of iodine, which renders the infusion of the latter blue, owing to the cellular part, which contains starch, being left upon the bark: the cold infusion of genuine cinnamon gives no blue tint with the above test.

Oil of Cinnamon.—In this oil, when good and genuine, pungency and sweetness are combined with a peculiarly grateful aroma. There are two varieties, the heavy and the light; the former is said to be the exclusive produce of the bark, and the latter of the leaves and twigs. When it has a rough and less agreeable flavour, and is very hot upon the tongue, adulteration with oil of cassia may be suspected. There is no test by which genuine oil of cinnamon can be accurately distinguished from that which is partly spurious; but a moderately experienced tongue, and careful comparison with a good sample, enable us to determine without difficulty upon its excellence. To taste it, however, in perfection, about two drops may be dissolved in a drachm of alcohol, and diluted with an ounce of water; the relative merits of different samples of the oil become then very apparent. It is imported from Ceylon.

One hundred and twelve pounds of recent cinnamon are said to afford an average product of three ounces of oil, part of which floats, and part falls, in water. The bark from which the oil has been drawn is sometimes dried and intermixed with good cinnamon.

Cinnamon forms a part of many formulæ in the London and other Pharmacopœiæ; its more exclusive preparations are the following: they are chiefly used as agreeable adjuncts and condiments; and cinnamon water, more or less diluted, is a pleasant vehicle for various bitters. The tincture, from its astringency, is usefully added to chalk-mixture and other remedies for checking common diarrhœa; and in the *Mistura Spiritus Vini Gallici* flavour and warmth are given by the oil, which, however, may generally be safely added in double or treble the quantity prescribed.

AQUA CINNAMOMI.	CINNAMON WATER.
℞ Cinnamomi contusi, libram cum semisse, *vel* Olei Cinnamomi, drachmas duas, Spiritûs tenuioris, fluiduncias septem, Aquæ, congios duos; Destillet congius.	Take of Cinnamon, bruised, a pound and a half, *or of* Oil of Cinnamon, two drachms, Proof Spirit, seven fluid ounces, Water, two gallons; Let a gallon distil.
PULVIS CINNAMOMI COMPOSITUS.	COMPOUND POWDER OF CINNAMON.
℞ Cinnamomi, uncias duas, Cardamomi, unciam cum semisse, Zingiberis, unciam, Piperis longi, unciam dimidiam; Tere simul, ut fiat pulvis subtilissimus.	Take of Cinnamon, two ounces, Cardamoms, an ounce and a half, Ginger, an ounce, Long Pepper, half an ounce; Rub them together into a very fine powder.
SPIRITUS CINNAMOMI.	SPIRIT OF CINNAMON.
℞ Cinnamomi Olei, drachmas duas, Spiritûs tenuioris, congium, Aquæ, octarium; Misce; tum lento igne destillet congius.	Take of Oil of Cinnamon, two drachms, Proof Spirit, a gallon, Water, a pint; Mix; then, by a gentle fire, let a gallon distil.
TINCTURA CINNAMOMI.	TINCTURE OF CINNAMON.
℞ Cinnamomi contusi, uncias tres cum semisse, Spiritûs tenuioris, octarios duos; Macerâ per dies quatuordecim, et cola.	Take of Cinnamon, bruised, thee ounces and a half, Proof Spirit, two pints; Macerate for fourteen days, and filter.
TINCTURA CINNAMOMI COMPOSITA.	COMPOUND TINCTURE OF CINNAMON.
℞ Cinnamomi contusi, unciam, Cardamomi contusi, unciam dimidiam, Piperis longi, contriti, Zingiberis concisæ, singulorum drachmas duas cum semisse, Spiritûs tenuioris, octarios duos; Macerâ per dies quatuordecim, et cola.	Take of Cinnamon, bruised, an ounce, Cardamoms, bruised, half an ounce, Long Pepper, powdered, Ginger, sliced, of each, two drachms and a half, Proof Spirit, two pints; Macerate for fourteen days, and filter.

MISTURA SPIRITUS VINI GALLICI.	MIXTURE OF FRENCH BRANDY.
℞ Spiritûs Vini Gallici,	Take of French Brandy,
Aquæ Cinnamomi, singulorum fluiduncias quatuor,	Cinnamon Water, each, four fluid ounces,
Ovorum duorum vitellos,	The yolks of two eggs,
Sacchari purificati, unciam dimidiam,	Purified Sugar, half an ounce,
Cinnamomi Olei minima duo;	Oil of Cinnamon, two minims;
Misce.	Mix.

CISSAMPELOS PAREIRA, *see* PAREIRA.

CITRUS, *see* LIMONES.

CLOVES, *see* CARYOPHILLI.

COCCI. *Coccus Cacti.* The Cochineal insects. *Ord.* Hemiptera.

This valuable insect is imported from Mexico and New Spain, where it feeds on several species of *cactus*. It is small, rugose, and of a deep mulberry colour; and, except in the males, which are scarce, the head is not to be distinguished from the body: the females are without wings, and very sluggish and torpid. They are scraped from the plants into bags, killed by boiling water, and then dried in the sun; those insects are preferred which are plump, dry, and of a silvery appearance. Those which are of a dark hue are usually artificially discoloured, probably to make them resemble the kind which is most preferred abroad.

The great consumption of cochineal is by the dyers of scarlet cloth: the annual importations into Europe exceed 60,000 lbs. According to M. Fée, from 42,000 to 45,000, and according to Réaumur, 65,000 insects go to the pound.

In pharmacy, cochineal is chiefly used as a colouring material, and as such it is added to several tinctures. It has been recommended as allaying the spasmodic action in whooping cough, especially when administered with carbonate of potassa; but its efficacy is at least very doubtful, and generally discredited. It has also been employed as an anodyne in neuralgia, in the form of a saturated tincture, of which 120 drops have been given twice a day. Its taste is slightly bitter, and the odour peculiar.

The principal adulteration to which cochineal is liable is the admixture of a manufactured imitation composed of coloured dough. These spurious grains are detected by the action of boiling water, which dissolves and disintegrates them, while it has little action upon the genuine insect. To increase the weight of cochineal, it has been rubbed over with finely-powdered sulphate of baryta. It has been analysed by Pelletier and Caventou (*Ann. de Chim. et Phys.*, VIII., 250), who found in it a peculiar colouring matter (carminia), an animal principle (coccina), stearine, elaine, an odoriferous acid, and saline matters.

COCCULUS PALMATUS, *see* CALUMBA.

COCCULUS INDICUS. The seed of the *Cocculus tuberosus*. It contains a peculiar poisonous principle, which has been called *picrotoxia* (from πικρος, *bitter;* τοξικον, *poison*).

COLCHICI CORMUS. } The *cormus* and *seeds* of the *Colchicum*
COLCHICI SEMINA. } *autumnale*, or Meadow Saffron. *Cl.* 6. *Ord.* 3. Hexandria Trigynia. *Nat. Ord.* Melanthaceæ.

This species of colchicum is a hardy perennial, found in our meadows, and flowering in September; its bulbous root then decays, and the new bulbs are in greatest perfection from early in June to the middle of August. The bulb is solid, oval, and covered with a brown membrane; the leaves are radical and spear-shaped; they die away before the autumn, and are followed by the flower, which has no calyx, is pale pink, springs directly from the bulb, and consists of a tube about six inches long, half of which is hid in the ground, and a limb divided into six lance-shaped segments; the filaments are about half the length of these segments, united to the upper part of the tube, and support yellow erect anthers; the stigmas are revolute; the fruit is a three-lobed and celled capsule, on a thick, short peduncle; the germen remains underground till the spring, when it rises with the leaves; the seeds are ripe in June, or the beginning of July.

The bulbs contain an acrid milky juice, in which Pelletier and Caventou detected a salifiable body, which they considered identical with veratria; but, according to Hesse and Geiger, its efficacy and acrimony are referable to a peculiar alkaloid which they call *Colchicia*, and which may be obtained by digesting colchicum seeds in boiling alcohol, precipitating by magnesia, drying the precipitate, and digesting it in boiling absolute alcohol. It is bitter, less acrid than veratria, and forms crystallisable salts. Vinegar and wine are its best solvents.

"To preserve the virtues of the plant, the bulb, as soon as possible after it is dug up, should be cut into transverse slices not thicker than $\frac{1}{8}$th of an inch, and dried by placing the slices upon clean white paper, distinct from each other, without heat, or at a very low temperature. The test of the drug being good and properly dried, is the appearance of a blue colour on rubbing it with a little distilled vinegar and alcoholic solution of guaiacum. The slices also should not appear deeply notched, or panduriform, as this is the mark of the bulb having begun to empty itself for the nourishment of the young bulbs, and consequently to suffer in its medicinal powers from the chemical change which at this period its contents must necessarily undergo for the nourishment of the offsets. It should be kept in slices in well-stopped bottles." (*Lond. Disp.*)

The seeds and the flowers of this plant partake of the activity of the root; the former were recommended by Dr. Williams as more mild, but not less effective, than the root; it is probable, also, that the leaves might be employed; they are not eaten by quadrupeds, though it is said that horses eat the flowers with impunity. As colchicia, in the state in which it exists in this plant, is not volatile, they might be used in a dried state. Vinegar, wine, and proof spirit are used as solvents of the active parts of colchicum; two extracts, an acetic tincture of the cormus, two tinctures of the seeds, and a vinous tincture of the cormi, are in the *London Pharmacopœia;* a syrup of colchicum and an oxymel, are included in the formulæ of the Edinburgh and Dublin colleges. The *Extractum Colchici Cormi* of the London college is directed to be prepared by pressing out the juice and evaporating, as in the process of making extract of aconite (page 13). The other formulæ are as follow:—

Acetum Colchici.	Vinegar of Colchicum.
℞ Colchici Cormi recentis concisi, unciam, Aceti destillati, fluiduncias sedecim, Spiritûs tenuioris, fluidunciam; Colchici cormum macera cum aceto, in vase vitreo operto, per dies tres; dein exprime et sepone, ut fæces subsidant; denique liquori defæcato spiritum adjice.	Take of the fresh Cormus of Colchicum, sliced, an ounce, Distilled Vinegar, sixteen fluid ounces, Proof Spirit, a fluid ounce; Macerate the cormus of the colchicum with the vinegar in a stopped glass vessel for three days, then press out and set aside that the fæces may subside; lastly, to the clear liquid, add the spirit.
Extractum Colchici Aceticum.	Acetic Extract of Colchicum.
℞ Colchici Cormi recentis, libram, Acidi Acetici fluiduncias tres; Contunde cormos, insperso gradatìm acido acetico, dein exprime succum, eumque in vase fictili plumbo non vitrifacto, ad idoneam crassitudinem consume.	Take of fresh Cormus of Colchicum, a pound, Acetic Acid, three fluid ounces; Bruise the cormi, gradually sprinkling them with the acetic acid, then express the juice and evaporate it in an earthen vessel not glazed with lead, to a proper consistence.
Tinctura Colchici.	Tincture of Colchicum.
℞ Colchici Seminum contusorum, uncias quinque, Spiritûs tenuioris, octarios duos; Macera per dies quatuordecim, et cola.	Take of Colchicum Seeds, bruised, five ounces, Proof Spirit, two pints; Macerate for fourteen days, and filter.
Tinctura Colchici Composita.	Compound Tincture of Colchicum.
℞ Colchici Seminum contusorum, uncias quinque, Spiritûs Ammoniæ Aromatici, octarios duos; Macera per dies quatuordecim, et cola.	Take of Colchicum Seeds, bruised, five ounces, Aromatic Spirit of Ammonia, two pints; Macerate for fourteen days, and filter.
Vinum Colchici.	Wine of Colchicum.
℞ Colchici Cormi exsiccati concisi, uncias octo, Vini Xerici, octarios duos; Macera per dies quatuordecim, et cola.	Take of dried Cormus of Colchicum, sliced, eight ounces, Sherry Wine, two pints; Macerate for fourteen days, and filter.

The acetic tincture, or vinegar of colchicum, should have been prepared with dry, instead of fresh, cormi; and doubts are entertained as to the propriety of employing ammonia in the preceding compound tincture. The vinous tinctures of the dried cormus, and of the seeds, are found to be the most certain and effective forms; in the extracts, the necessary exposure to heat is liable to modify the activity of the preparation.

Colchicum is the *Hermodactyl* of ancient pharmacy; it seems originally to have been employed chiefly as a diuretic in dropsical affections, but as such it is uncertain in its action. In gout, it may almost be called a specific, for it very rarely fails to allay the pain and inflammation, and occasionally altogether breaks up the paroxysm, sometimes acting upon the bowels, at others upon the kidneys and skin, and often without any such accompanying effect. In acute and chronic rheumatism it is also represented as a valuable remedy; a single dose will sometimes allay obstinate pains of the joints and tendinous expansions. Small doses frequently repeated are, however, preferable; and, if they operate favourably, they generally increase the secretion of urine, and remove the red sediment which in such cases it usually deposits. When it purges, it produces bilious evacuations, and diminishes the activity of the arterial system. In some cases, colchicum has appeared to accumulate in the system, and after the continuous use of it in small doses, has brought on unmanageable diarrhœa, with great prostration of power.

Sir Everard Home ascribes much of the griping and nauseating effect that sometimes follows the use of the vinous, or other tinctures of colchicum which have not been carefully filtered, to the sediment which forms in them, and which may be removed without injury to the specific effect of the medicine.

Acids are said to render the operation of colchicum violent and drastic; whilst alkalies produce a milder but not less efficacious operation; and the acetic tincture, or even the wine, may without impropriety be administered with magnesia. About ♏xxx of the *Vinum Colchici* may be regarded as a medium dose, and may be taken when the paroxysms of pain are violent: the evening is the best time for its administration, and the following is a good form:—

℞ Vini Colchici, fʒss.
Magnes. Carbon. gr. xv.
Aquæ Cinnam.
Aquæ, āā fʒss. M.

Dr. Thomson recommends a saturated vinous tincture, made by macerating an ounce and a half of the *dried* bulb in 12 ounces of white wine; from 30 to 60 minims may be taken whenever the patient is in pain. The fresh roots are probably employed under the apprehension of careless drying, but if not used as soon as removed from the earth, vegetation goes on, and their qualities are as effectually changed as if they had remained buried.

The *Acetum Colchici*, and the *extracts*, as above directed, have been found practically objectionable in consequence of their varying strength. From one to two grains of the *acetic extract*, two or three times a day, is, however, frequently prescribed in gout, and in acute rheumatism. It appears not improbable that when the nature and properties of the active alkaloid of colchicum have been more fully investigated, improved forms for its exhibition will be discovered: at present it is necessary to begin in all cases with small doses, and gradually to increase them till they produce their desired effect, for many causes seem to interfere with, and modify the activity of the formulæ in general use.

COLLYRIUM (from κολειν, *to check; ρους, running*). An astringent lotion; the term is generally applied to eye-washes.

COLOCYNTHIS (from κωλον, *the colon*, and, κινεω, *I move:* in reference to its purgative powers). *Peponum pulpa exsiccata.* The dried pulp of the fruit of the *Cucumis colocynthis*, or Bitter Cucumber. *Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Cucurbitaceæ.

This plant is a native of Turkey and Nubia; it is a trailing annual. Its root is divided into branches, which run deep into the ground; the stems are hairy; the leaves triangular, obtuse, sinuated, hairy, green on the upper surface, and rough and pale beneath; the flowers are yellow, solitary, and appear at the axillæ of the leaves; the calyx of the male flowers is bell-shaped, and divided at the brim into five tapering segments; the corolla is monopetalous, bell-shaped, and divided at the limb into five pointed segments; the filaments are three, two of which are bifid at the apex,—they are short and inserted into the calyx; the anthers are linear, long, erect, and adhere together on the outer side; the calyx and corolla of the female flower are similar to those of the male; the three filaments are without anthers; the style is short, cylindrical, and furnished with three stigmata, which are thick, gibbous, and bent outwards; the fruit is round, and as large as an orange, divided into three cells, abounding in pulpy matter, intersected by cellular matter, and includes many ovate compressed fawn-coloured seeds. The flowers appear from May to August.

The fruit is imported dried, and generally peeled, and is known by the name of *bitter-apple.* Its dried pulp is nearly white, inodorous, light, and spongy, mucilaginous, and intensely and nauseously bitter. It is almost entirely soluble in boiling water; the infusion is yellow, gelatinous; it forms precipitates in solutions of acetate of lead, and of nitrate of silver, and is rendered olive-coloured by sulphate of iron. Meissner obtained from 100 parts of dry pith of colocynth—

Colocynthia (a peculiar bitter principle).	18·4
Slightly bitter extractive . . .	10·0
Bitter fixed oil	4·4
Resin, insoluble in ether . . .	13·2
Gum and starch	24·1
Phosphate of lime	2·7
Phosphate of magnesia	3·0
Fibre	19·2
Water	5·0
	100

The pulp of colocynth is a powerful drastic purgative, and in overdoses produces great irritation in the alimentary canal, spasm, bloody evacuations, and other untoward symptoms.

It was employed by the ancients in lethargy, mania, and dropsy. It is a valuable adjunct to other cathartics, and of these combinations the compound extract of the *London Pharmacopœia* is the most useful form. It is scarcely prescribed alone, nor is the simple extract often employed; it is indeed uselessly retained in the Pharmacopœia, and as it is very prone to become mouldy and deteriorated by age, it cannot always be depended upon, so that, when simple colocynth is required, it is better to use the powdered pith, which is nearly as efficacious, weight for weight, as the simple extract.

Extractum Colocynthidis.	Extract of Colocynth.
℞ Colocynthidis concisæ, libram,	Take of Colocynth, cut in pieces, a pound,
Aquæ destillatæ, congios duos;	Distilled water, two gallons;
Misce, et coque lento igne per horas sex, aquam destillatam subindè adjiciens, ut eandem mensuram semper impleat. Liquorem adhuc calentem cola; denique ad idoneam crassitudinem consume.	Mix, and boil with a slow fire for six hours, occasionally adding distilled water, that it may always fill the same measure. Strain the liquor while hot; lastly evaporate it to a proper consistence.

Extractum Colocynthidis Compositum.	Compound Extract of Colocynth.
℞ Colocynthidis concisæ, uncias sex,	Take of Colocynth, cut into pieces, six ounces,
Aloës Extracti purificati, uncias duodecim,	Purified extract of Aloes, twelve ounces,
Scammonii contriti, uncias quatuor,	Scammony, in powder, four ounces,
Cardamomi contriti, unciam,	Cardamom, in powder, an ounce,
Saponis, uncias tres,	Soap, three ounces,
Spiritûs tenuioris, congium;	Proof Spirit, a gallon;
Macera colocynthidem in spiritu leni calore, per quatriduum. Spiritum cola, eique adjice aloën, scammonium et saponem; dein ad idoneam crassitudinem consume, cardamomo sub finem admixto.	Macerate the colocynth in the spirit in a gentle heat for four days, strain off the spirit, and add to it the aloes, scammony, and soap; then evaporate to a proper consistence, the cardamom being added towards the end.

The preceding extract, when carefully made, is a valuable purgative; it should be sufficiently dry for reduction into powder, so as to prevent the necessity of heating it for the formation of pills. Some difference of opinion has been entertained respecting the propriety of the addition of the soap, which is supposed to render the extract incompatible with calomel; this, however, is not the case, and the soap has the advantage of increasing the solubility of the compound, so that, when pills chiefly composed of it have hardened by age, they retain their activity, and are soluble in the secretions of the stomach.

Much difference is occasionally found in the activity of this extract, obtained from different sources; half a drachm of one sample being sometimes less purgative than ten grains of another. This arises either from carelessness in its preparation, as when overheated; or inattention to the goodness of its ingredients, more especially of the scammony; or, not unfrequently, to fraudulent substitution of some of its components. It is said that seeds of colocynth are sometimes substituted for an equal weight of pulp; if so, the extract must be much less active, as the seeds are inert, being oleaginous, like those of other *Cucurbitaceæ.* Colocynth pulp which is dense and deep gray, or dirty brown, is unhealthy, or has been injured in drying, and should be rejected.

From five to ten grains of the compound extract of colocynth is an average dose; it is generally combined with calomel, or used in small quantities to sharpen the activity of rhubarb and the milder aperients. A few drops of essential oil is a proper addition to prevent griping.

℞ Hydrargyri Chloridi, gr. xij.
Extract. Colocynthidis compos. ʒss.
Olei Caryophyll. ♏viij.
Fiant massa in pilulas aperientes octo dividenda; quarum sumantur duæ vel tres pro dosi.

A milder but active aperient pill is composed as follows:—

℞ Pulveris Rhei,
Pilulæ Hydrargyri, āā ʒss.
Extracti Colocynthidis compos. ʒj.
Olei Carui, ♏xij.
Divide in pilulas xxiv.—duæ vel tres pro dosi.

Dr. Paris gives the following as the composition of "Barclay's Antibilious Pills:"—Take of Extract of Colocynth, ʒij., Extract of Jalap, ʒj., Almond Soap, ʒiss., Guaiacum, ʒiij., Tartarised Antimony, gr. viii., Essential Oils of Juniper, Carraway, and Rosemary, of each, gutt. iv., Syrup of Buckthorn, as much as is sufficient to form a mass, to be divided into 64 pills.

COLTSFOOT, *see* TUSSILAGO.

CONFECTIONS (from Conficio, *I make up*). The conserves and electuaries of former Pharmacopœiæ are now included under this term; sugar is one of their leading ingredients. They are separately described under the heads annexed:—

Confectio Amygdalæ . .	Confection of Almonds, *see* AMYGDALA.
Confectio Aromatica . .	Aromatic Confection, *see* CROCUS.
Confectio Aurantii . . .	Confection of Orange-peel, *see* AURANTIUM.
Confectio Cassiæ	Confection of Cassia, *see* CASSIA.
Confectio Opii	Confection of Opium, *see* OPIUM.
Confectio Piperis Nigri .	Confection of Black Pepper, *see* PIPER NIGRUM.
Confectio Rosæ Caninæ .	Confection of Dog-rose, *see* ROSA CANINA.
Confectio Rosæ Gallicæ .	Confection of French-rose, *see* ROSA GALLICA.
Confectio Rutæ	Confection of Rue, *see* RUTA.
Confectio Scammonii . .	Confection of Scammony, *see* SCAMMONIUM.
Confectio Sennæ	Confection of Senna, *see* SENNA.

CONGIUS. A gallon. A measure containing eight pints. The *imperial gallon* contains 10 avoirdupois pounds of distilled water, at the temperature of 62° Fahrenheit: of this, the *octarium*, or pharmaceutical *pint*, is an eighth part.

CONII FOLIA ET FRUCTUS. The *leaves* and *fruit* (seed) of the *Conium maculatum* (from κονις, *dust*). Hemlock. *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

Hemlock is a common umbelliferous biennial, flowering in June and July. Its stem and leaves emit a strong peculiar odour, which has been compared to that of cat's urine. It is distinguished from other plants of the same natural order by the dark and shining colour of its lower leaves, by its large and spotted stem, and by its odour.

The root is tapering, often forked, eight or ten inches long, and finger-thick; the stalk is five or six feet high, round, shining, and speckled, towards the top branched and striated, near the bottom about three inches in circumference, and covered by a powdery blueish exudation; the lower leaves are large, tripinnated, shining green, standing upon long striated concave footstalks, which proceed from the joints of the stem; the upper smaller leaves are bipinnated, and placed at the divisions of the branches; the flowers are produced in umbels, universal and partial, and composed of several striated radii; the universal involucrum consists of five or seven leaves, lanceolated, whitish at the margin, and bent downwards; the partial involucrum is composed of three or four leaves placed on the outer side of the radical stalk; the petals are five, oval, white, and curl inwards at their points; the stamina are about the length of the corolla, and crowned with whitish anthers; the two styles are filiform, inclining inwards, and terminated by round stigmas; the fruit is smooth, oval, striated, consisting of two irregularly-hemispherical, striated, brownish seeds.

The leaves should be collected for pharmaceutical use just before the plant flowers, and the stalks having been picked off, they should, if intended for powder, be carefully dried, either by exposure to sun and air, or in a very moderately heated stove. In this state they may be preserved in green glass bottles; or the powder may be kept in closely-stopped opaque phials. It is, however, doubtful how far dependance can be placed upon the medicinal activity of this plant when it has been dried; and, upon the whole its other preparations are certainly preferable. Its medical efficacy is said to vary considerably with the climate under which it is produced: in Italy, Spain, and Portugal, it is represented as possessing a degree of narcotic power far beyond that which it attains in this country; and in warm and dry seasons its activity exceeds that which it possesses in cold and wet weather.

The seed of hemlock is inodorous, bitterish, and somewhat acrid, and contains fixed oil; it possesses the narcotic powers of the plant.

The active principle of hemlock is an alkaloid of a peculiar character; it was first identified by Geiger, and by Boutron-Charlard, and O'Henry, and has been examined more in detail by Dr. Christison (*Edinburgh Phil. Trans.* 1836, p. 383). When the leaves or seeds of hemlock are distilled with water, the fluid which goes over has the odour of the plant, but is not poisonous; on the contrary, when caustic lime or potash are previously added to the green seeds or leaves, and distilled with water, the liquid which passes over is alkaline and poisonous. When ten or twelve pounds of the seeds are worked at once, an oily matter comes over at first, which is nearly pure *conia*, but the greater part of the alkaloid is dissolved in the distilled water: if this be re-distilled, it loses a little of its strength, but if previously neutralised by sulphuric acid, the poisonous principle becomes fixed, and water alone distils over. The residue consists of sulphate of conia, sulphate of ammonia, and resin, the latter being produced by the decomposition of a part of the conia. To obtain the conia, this residue is digested in a mixture of two parts of alcohol and one of ether, which leaves the sulphate of ammonia, and then, the alcohol and ether being carefully distilled off, the remaining sulphate of conia is heated gently in a retort with a little water and caustic potash, when there is obtained in the receiver a watery solution of conia, with a layer of nearly pure hydrated conia floating upon it, containing a trace of ammonia. The water may be extracted by chloride of calcium, and the ammonia by exposure in vacuo.

Conia thus obtained, resembles a colourless volatile oil, lighter than water, of a powerful diffusible odour, somewhat like that of hemlock, and an intensely acrid taste. It has a strong alkaline action on reddened litmus and on turmeric. It is readily soluble in, and neutralised by, dilute acids, but its salts have not been crystallised. It is sparingly soluble in water, and combines with about a fourth its weight of water to form a definite *hydrate:* this hydrate, and its aqueous solution, become opaque when slightly heated, and again transparent on cooling. Exposed to air, conia soon becomes brown, and is slowly resolved into a resinous matter, with a disengagement of ammonia, so that it requires to be carefully excluded from air; heat accelerates this change. It readily distils over with water at 212°, but its boiling-point is 370°; it cannot be distilled alone, or with water, without partial decomposition. Its ultimate elements, according to Liebig, are, 66·91 carbon, 12·01 hydrogen, 8·28 oxygen, and, 12·80 nitrogen.

Dr. Christison observes, that conia is most abundantly obtained from the fully-developed seeds, but still green; even from them, however, the quantity is small; from forty pounds, he obtained two ounces and a-half of hydrated conia; but it probably exists in the plant in larger proportion, for much of it is always decomposed in the processes of separation, as is indicated by the evolution of ammonia.

Geiger says that the *dried* leaves of hemlock contain no conia, and that it is not to be found in many specimens of the extract; hence the discrepancies respecting their efficiency. According to Dr. Christison, the extract becomes feeble, or inert, in two ways; either by having been overheated towards the end of the process, or by having been long kept exposed to air; in both cases ammonia is formed, and extracts well prepared at first, become inert in a few years. To ascertain if conia be present, the extract, or other preparation, may be triturated with solution of potassa, upon which, the odour of conia, if present, is strikingly perceptible. The alcoholic extract of the ripe seeds appears to be most efficacious. Probably, however, some salt of conia will prove to be the most effective and convenient form for its medical use.

Conia is a deadly poison to every order of animals; it first palsies the voluntary muscles, then the respiratory muscles and the diaphragm, thus producing death by asphyxia. The heart continues to act after other signs of life are extinct. Few poisons equal it in subtilty or swiftness: a drop put into the eye of a rabbit, killed it in nine minutes; three drops in the same way killed a strong cat in a minute and a half. Two grains of conia, neutralised by hydrochloric acid, and injected into the femoral vein of a young dog, produced almost instantaneous death: "in two seconds, or three at furthest, and without the slightest warning struggle, respiration had ceased, and with it all external signs of life."

Conia is probably combined in the recent plant with some vegetable acid; this, however, has not been ascertained.

There are two preparations of hemlock directed in the Pharmacopœia, an extract, and a tincture, in both of which the leaves are exclusively used; the following are the formulæ:—

Extractum Conii.	Extract of Hemlock.
℞ Conii foliorum recentium, libram;	Take of fresh leaves of Hemlock, a pound;
Contunde in mortario lapideo insperso exiguo aquæ; dein exprime succum, eumque non defæcatum, ad idoneam crassitudinem consume.	Bruise them in a stone mortar, sprinkled with a little water, then express the juice, and evaporate it, unstrained, to a proper consistence.

Tinctura Conii.	Tincture of Hemlock.
℞. Conii foliorum exsiccatorum, uncias quinque,	Take of dried leaves of Hemlock, five ounces,
Cardamomi contusi, unciam,	Cardamoms, bruised, an ounce,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

Of these preparations the *extract* is most to be relied on, and when fresh and carefully prepared, is an active and useful remedy; the causes of its uncertainty, the modes of testing its efficacy, and the precautions requisite in its preparation, will be obvious from the preceding statement respecting the nature and properties of its active principle. The most active extract is that which is procured by moderate pressure from the leaves only; when the stalks and stems are used, and violent pressure employed, the extract is glutinous, dark-coloured, and viscid, and less active than in the former case, when it has a somewhat mealy consistency, and an olive-green colour. With every caution, however, on the part of the operator, the colour, odour, and efficacy of extract of hemlock will vary with the season and with the situation and soil in which the herb has grown. The best method of preparing this and similar extracts, consists in gradually heating the expressed juice to a temperature of about 212°, then to suffer it to cool, to strain it through moderately fine linen, and evaporate the strained liquor, and when it has nearly acquired a proper consistency, to add the matter which remained upon the strainer.

The preparation of this extract almost necessarily requires the use of a proper steam apparatus, for over an open fire it is deteriorated by the heat, and in a water-bath the evaporation is so prolonged as to injure it. One hundred weight of the fresh herb yields from three to five pounds of extract, according to the state and quality of the plant.

When extract of hemlock is very dark-coloured, viscid, nearly inodorous, or having a burned odour resembling treacle, or when mouldy, or covered with saline efflorescence, it should be rejected; its odour should resemble that of the fresh plant, and become more powerful, from the evolution of conia, when triturated with a few drops of solution of potassa; if, when thus treated, it only gives out ammonia, its efficacy may be doubted. With every precaution, however, the activity of extract of hemlock is liable to such uncertainty as to require much care in its exhibition; two or three grains of one sample are sometimes as powerful as twenty or thirty of another; hence the necessity of beginning with doses of one or two grains, and gradually augmenting them till they produce the expected result.

In the present state of pharmacy, the extract is the only preparation of hemlock which can be trusted; the powder of the dried leaves is more uncertain, and the tincture (prepared with the dried leaves) is similarly objectionable. Perhaps a tincture of the seeds might afford a preparation of more certainty, but until the properties of conia and its salts have been more fully investigated in their pharmaceutical relations, the carefully prepared extract must be preferred to other forms.

Hemlock is a powerful and useful sedative, and in those numerous cases in which opium is contra-indicated, it will occasionally allay pain and diminish irritability. Dr. Paris says, "According to my own experience, it is, in well-directed doses, by far the most efficacious of all palliatives for quieting pulmonary irritation. It has been extolled also in the cure of schirrus and cancer, and will without doubt prove in such cases a valuable resource, from its sedative influence. Externally, it will afford considerable relief in irritable ulcers when applied in the form of fomentation or cataplasm." It has been used as an alterative in scrofula, and in secondary syphilis, and as a sedative in chronic rheumatism, neuralgia, and other painful affections; also in whooping cough, and in those obstinate forms of cough which succeed pulmonic inflammation.

Extract of hemlock may be given in the form of pills, and in solution. The average dose is from one to three or four grains; if it produce vertigo, and nausea, its effects must be carefully watched, and the dose modified accordingly. It may be usefully combined with small doses of opium and of expectorants, as in the following formula, which is effectual in quieting the cough and bronchial irritation that succeed or accompany catarrh.

℞ Extracti Conii,
Pulv. Ipecac. compos. āā ʒj.
Misce et divide in pilulas triginta, quarum sumantur duæ horâ decubitus.

Dr. Stoerk administered hemlock as follows:—

℞ Extracti Conii,
Pulveris Foliorum Conii, āā;
Fiant pilulæ, singulis grana tria pendentibus. Initio sumat æger pilulam unam, mane nocteque; postea binas, deinde tres vel quatuor, et denique augeatur dosis quantum possit.

The following may be used to allay common or spasmodic cough:—

℞ Extract. Conii, grana v.
Misturæ Amygdalæ, fʒxiv.
Syrupi Papaveris, fʒij.
M. Sumat cochleare unum medium bis vel ter die.

The efficacy of extract of hemlock, as an external application in the form of lotion or poultice, is uncertain; it may be used in the usual way with bread and water, or dissolved in hot water in the proportion of an ounce to a quart.

In over-doses, extract of hemlock produces vertigo, wandering of the mind, dilatation of the pupil, paralysis, and ultimately, the symptoms above mentioned as resulting from conia. Emetics and purgatives are the only antidotes; they may be followed by ammonia, and mild stimulants. Vinegar, and the acids, which have sometimes been recommended, are theoretically inadmissible.

CONSERVE (from *conservo*), a composition in which substances are mixed with or preserved by sugar. *See* Confectio.

CONTRAJERVA. *Radix.* The root of *Dorstenia contrajerva. Cl.* 4. *Ord.* 1. Tetrandria Monogynia. *Nat. Ord.* Artocarpeæ.

This plant is a native of South America and the West Indies; it has a perennial, tapering, unequal, compact, rugose root, brown externally, whitish within, and furnished with fibres; the leaves are of irregular shape, lobed, dentated, pointed, veined, and placed upon long radical footstalks, which are winged towards the leaves; the flower-stems are round, simple, rise several inches in height, and each supports an irregular quadrangular receptacle, containing the parts of fructification; the flowers are male and female, immersed in the common receptacle, and occupying its entire disc; the former consist of two slender, short filaments, with yellow anthers (not therefore *tetrandria*), the latter of a roundish germen, supporting a simple style, terminated by an obtuse stigma; the capsule, when ripe, possesses an elastic power by which the seed is ejected.

Contrajerva root is a warm bitter; and mixed with chalk forms the *Pulvis Contrajervæ compositus* of former Pharmacopœiæ. The old physicians considered it as an antidote to all poisons, except corrosive sublimate. In modern times it has been employed in diarrhœa and dysentery; in atonic gout, and in chronic rheumatism; it also has been used as a diaphoretic tonic in various cases of febrile debility. It is one of the many articles of the Materia Medica, which, though once in great repute, has fallen into disuse.

CONVOLVULUS SCAMMONEA, *see* SCAMMONIUM.

COPAIBA. *Resina Liquida.* The *liquid resin* of the *Copaifera Langsdorfii.* *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Leguminosæ.

There are many species of *Copaifera*, all of which yield the balsam, hence, probably, the various characters which it possesses. The *Copaifera officinalis*, or, as it is now called, *Langsdorfii*, is a tall, branching tree, covered by brown rough bark; the leaves are large, pinnated, with four pairs of pinnæ, which are alternate; they are pointed, ovate, and stand upon short footstalks; the flowers are white, and produced in terminal branched spikes; there is no calyx; the petals are four, oblong, acute, concave, and spreading; the filaments are ten, slender, incurved, rather longer than the corolla, and crowned by oblong incumbent anthers; the germen is round, compressed, and stands upon a short pedicle; the style is filiform, incurved, as long as the filaments, and having an obtuse stigma; the fruit is an oval bivalvular pod, containing one egg-shaped seed, involved in a berried arillus. It is native in South America, and in the West Indian Islands.

The liquid resin is obtained by boring the trees near the base of the trunk, when it flows abundantly. It is chiefly imported from Brazil, in casks, containing from one to one and a-half hundred weight. It has the consistency of oil, but is more viscid and glutinous; a pale-yellow colour; a peculiar and somewhat aromatic odour; and a pungent and rather nauseous taste. Its specific gravity varies from 0·95 to 0·96. It communicates flavour to water shaken with it, and is perfectly soluble in about eight parts of alcohol, and in ether in any proportion. When rubbed upon paper and dried, it leaves an apparently greasy stain, but this differs from that of oil, by admitting of being written over with common ink. If adulterated with oil, the stain would of course be truly greasy, but I have rarely met with any samples which I have seen reason to believe sophisticated by the addition of oil. The appearance of the article as it occurs in trade differs considerably, but this is probably chiefly owing to the circumstances under which it is collected, to the trees whence it is obtained, and to its age. "Its adulteration by castor-oil is discovered by mixing three parts of the suspected balsam with one part of sulphuric acid; if it be pure, a *plastic* reddish mass will be formed; if it contain castor-oil, the consistence is that of turpentine, and it is scarcely coloured. An easier mode is to agitate in a bottle one part of *liquor ammoniæ* with two and a-half of copaiba; if the mixture remain cloudy after standing at rest for some time, it contains castor-oil. If copaiba balsam be pure, it rapidly solidifies when mixed with calcined magnesia; if this be not effected, the balsam is impure, and contains a fixed oil." (THOMSON'S *Lond. Disp.*)

It appears to me that the chief adulteration to be apprehended is with certain species of turpentine, and that this fraud will not be detected by these methods. According to some, a large quantity of this article, as sold in London, is entirely factitious. Some years ago, a trial took place between the owner of certain premises that were burnt down, and the

Directors of the Sun Fire-office, in consequence of the latter refusing to indemify the proprietor, because the fire had been occasioned by his *making* balsam of copaiba. (*Pharmacologia.*)

The term *balsam* being generally restricted to compounds of resin and benzoic acid, is not applicable to this substance; nor is it strictly a liquid resin, but a compound of volatile oil and resin. When distilled, the former, which is highly odorous and pungent, and upon which the virtues of copaiba depend, passes over, and there remains an insipid resin in the retort, which has sometimes been employed in medicine under the name of *inspissated copivi balsam.* In good copaiba balsam the proportion of oil to resin is about 40 to 60. Its specific gravity, when freed from water by digestion on fused chloride of calcium, is ·878; absolute alcohol dissolves about two-fifths its weight of it; it is soluble in all proportions in ether. It appears from the experiments of Blanchet and Sell (*Journ. de Pharm.*) to be a hydrocarbon, containing about 88 per cent. of carbon, and 12 per cent. of hydrogen.

Medical Uses and Properties.—Copaiba has long been used in gleets, fluor albus, and other similar discharges; it has also been employed in hæmorrhoidal affections. It operates chiefly as a diuretic; in large doses it proves aperient. Where there is inflammatory action in the urinary canals, this remedy should be avoided; yet I have seen it allay the irritation and diminish the secretion of uric sand.

It is given in doses of 10 minims to fʒj. twice or thrice a day, either simply upon water, or triturated into an emulsion with yolk of egg or gum arabic. One drachm, administered three times a day, in piles, generally purges. It is apt to nauseate, especially when given in emulsion, but this effect may be prevented by the addition of some aromatic water, as in the following:—

℞ Mucilaginis Acaciæ, ʒiss.
Copaibæ, ʒss. tere simul et adde gradatim,
Aquæ Menthæ, f℥j.
Tincturæ Capsici, ♏iij.
M. fiat haustus, bis vel ter quotidie sumendus.

Dr. Paris prescribes it as follows, as an antilithic in cases of uric diathesis:—

℞ Copaibæ, ʒss.
Mucil. Acaciæ, fʒij. tere simul et adde,
Sodæ Carbonatis, gr. x.
Mistur. Amygdal. fʒj.
Tinct. Opii, ♏v.
Fiat haustus urgente dolore sumendus.

According to Dr. Chapman, copaiba is best exhibited by pouring it upon half a wine-glass full of water, and afterwards slowly adding a few drops of bitter tincture, by which means the copaiba will be collected into a globule that may be easily swallowed, while its taste is masked by the bitterness.

COPPER, *see* Cuprum.

CORIANDRUM (*κόρις, a bug;* from its odour). *Fructus.* The *fruit* of the *Coriandrum sativum. Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This plant is a native of the south of Europe; it is, however, not uncommon in corn-fields, and soil on the road-side; it is an annual, with an erect, round, branched, smooth stalk, about two feet high; the leaves are variously pinnated; the flowers, which appear in June, are reddish-white, and placed in terminal umbels; the general corolla is irregular and unequal; the petals are five, oblong, bent inwards; the five filaments are slender, and furnished with roundish yellow anthers; the globular germen is placed between the insertion of the corolla, and supports two short styles, bent in opposite directions, and terminated by simple stigmas; the fruit is globular, and divisible into two hemispherical and concave seeds, with large interior vittæ, a form by which coriander is distinguished from other umbelliferæ. Every part of the fresh plant has a strong disagreeable odour when bruised.

Coriander seeds have a sweet but somewhat nauseous aromatic flavour. They are carminative and stomachic, and are occasionally prescribed in conjunction with cathartics. They enter into the composition of the *Confectio Sennæ* of the Pharmacopœia, and form one of the ingredients in *currie-powder.* When distilled with water, they yield a small quantity of essential oil. Their active parts are perfectly extracted by alcohol, but only imperfectly by water.

CORNU. *Horn.* The horn of the *Cervus elaphus*, the Stag, or Hart.

The horns of the stag are more analogous to bone than to common horn; they contain less phosphate of lime, however, and a larger relative proportion of gelatine, than is found in common bone. Hartshorn shavings, when boiled in water, yield about one-fourth of their weight of gelatine. Four ounces, boiled in a quart of water down to a pint, and strained, yield a tremulous and moderately agreeable jelly. Subjected to destructive distillation, horn, like bone, yields a considerable quantity of ammoniacal products; hence the terms *salt of hartshorn*, and *spirit of hartshorn*, applied to the impure solid and liquid carbonates of ammonia derived from the above source (*see* AMMONIA).

The following is the *Note* in the *Pharmacopœia* in reference to this article, together with Mr. Phillips' remarks, which are requisite to render it intelligible.

CORNU. Hoc postquam benè ustum fuerit, ex acido nitrico propèmodum liquatur; tum per ammoniæ oxalatem separatur calx; per plumbi autèm nitratem separatur acidum phosphoricum.	HORN. After it has been well burned it is almost entirely soluble in nitric acid; then by oxalate of ammonia lime is separated; by nitrate of lead, however, phosphoric acid is separated.

REMARKS. The phosphate of lime, of which the horn after burning almost entirely consists, is dissolved by the nitric acid; oxalate of lime is formed on adding oxalate of ammonia to the solution, which being insoluble in water, is precipitated. Phosphate of lead results from the union of the phosphoric acid with the oxide of lead of the nitrate, when added to the nitric solution, and this also being insoluble in water, it is precipitated.

CORRIGENS. That substance in a medicinal formula which is supposed to *correct* the operation of the more active ingredients.

COSMETIC (from *κοσμος*, *ornament*). A remedy which improves the complexion.

CREASOTON (from *χρεας*, *flesh*, and *σωζω*, *I save*). Creasote. *Oxy-hydro-carburetum, ex Oleo pyroxilico paratum.* An *oxy-hydro-carburet*, prepared from pyroxylic oil.

This compound was discovered by Reichenbach. When a large quantity of wood-tar is distilled, it yields a light and a heavy oil: the latter, when purified by distillation off carbonate of potassa, is mixed with solution of caustic potassa, heated, and afterwards separated again by the action of diluted sulphuric acid; it is then again distilled, mixed with phosphoric acid, to abstract a little ammonia, and ultimately rectified with water. The details of the whole process, which are very tedious, will be found in DUMAS's *Chimie appliquée aux Arts*, and in my *Manual of Chemistry*.

Creasote* is a colourless, transparent liquid, having a strong odour, like that of smoked meat; it has a hot, pungent taste, having a slight sensation of sweetness on the palate. Its specific gravity is 1·037. It boils at 397°; retains its fluidity at −17°; burns with a sooty flame. When mixed with water, two solutions result, the one consisting of 1·25 creasote and 100 water; the other of 100 creasote and 10 water. Creasote coagulates albumen and serum; it appears to be the principle which confers on wood-smoke and on pyroligneous acid, their antiseptic powers. It acts powerfully on the animal system; kills fishes and insects, and destroys vegetation, even when much diluted. It is medicinally used as a stimulant in atonic dyspepsia and anorexia, and to allay nausea and vomiting. It is applied externally for the relief of toothache, and of nervous and rheumatic pains; and also to foul ulcers, cancerous sores, and some cutaneous affections; also as a means of checking hæmorrhage.

℞ Creasoton, ♏iv. ad x.
Misturæ Camphoræ,
Infus. Gentian. compos. āā f℥vj.
M. fiat haustus.

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* The following characters of creasote are contained in the preliminary *Notes* of the *Pharmacopœia*:—

CREASOTON, oleosum, coloris expers, odore proprio, translucens, ebullit calore gradûs 397^{mi}. In caloris gradu − 50^{mo}. non congelatur. In acido acetico liquatur.	CREASOTE is oily, colourless, of a peculiar odour, translucent, boils by a degree of heat of 397. In the degree of heat (that is, at the temperature) of −50, it is not congealed. It is dissolved by acetic acid.

Unguentum Creasoti.	Ointment of Creasote.
℞ Creasoti, fluidrachmam dimidiam, Adipis, unciam; Tere et misce.	Take of Creasote, half a fluidrachm, Lard, an ounce; Rub and mix.

CRETA. *Calcis Carbonas friabilis.* Chalk. Friable Carbonate of Lime. *See* Creta Præparata, page 133.

Nota.	Note.
Creta, acido hydrochlorico diluto cum effervescentiâ tota liquatur. Hic liquor, ubi coctus fuerit, ammoniâ instillatâ, nihil demittit.	Chalk is entirely dissolved by dilute hydrochloric acid, with effervescence. This solution, when it has been boiled, deposits nothing on dropping in ammonia.

The object, probably, of these tests, is to show the absence of silica and other substances insoluble in dilute hydrochloric acid, and of alumina and phosphate of lime, by the non-action of ammonia, after the whole of the carbonic acid has been expelled from the solution by boiling it. Care must be taken to use perfectly pure and caustic ammonia, for if it contain any carbonic acid, carbonate of lime will be thrown down. Whiting is a useful form of chalk, and generally very pure.

CROCUS. *Saffron. Stigmata exsiccata.* The *dried stigmata* of the *Crocus sativus. Cl.* 3. *Ord.* 1. Triandria Monogynia. *Nat. Ord.* Irideæ.

This perennial bulbous plant is probably a native of Asia; it is largely cultivated in the south of Europe for medical use, and at one time it was much grown in England, chiefly in Essex and Cambridgeshire; and *English saffron* was much sought after in the market; it is indeed found in a wild state in some parts of this country. The bulb is solid and depressed, and the flower, which appears in September, before the leaves, is of a lilac colour, and raised on a slender white tube; the leaves are dark-green, linear, and somewhat revolute, with a white central nerve, and enclosed with the flower-tube in a membranous sheath. The corolla consists of six elliptical segments; the stamens are erect, and shorter than the corolla; and the style, which is of the length of the corolla, hangs out between its segments. The stigma is of a deep orange-colour, three-parted, and odorous.

Saffron is prepared as follows:—"The flowers are gathered early in the morning, just as they are about to blow; they are then spread upon a table, and the stigmas, with a portion of the style, carefully picked out of the flower, which is thrown away as useless. The stigmas are then dried upon a portable kiln of a peculiar construction, over which a hair-cloth is stretched, and over it several sheets of white paper are laid, upon which the wet saffron is spread two or three inches thick. It is now covered with other sheets of paper, and over them is laid a coarse blanket, five or six times doubled, which is pressed down with a board and a large weight, after the fire is lighted. The first heat is strong, to make the saffron sweat; and after an hour, when it is intended to form the saffron into a cake, it is turned, and the same degree of heat continued for another hour. The fire is then reduced to a moderate heat, which is kept up for twenty-four hours, during which time the cake is turned every half hour, so as to dry it thoroughly. It is then fit for the market. The finest saffron is not formed into a cake, but consists of the stigmas dried, and thence it is termed *hay saffron*." (*Lond. Disp.* Art. Crocus.)

Next to English saffron, that which is imported from France and Sicily is preferred to that from Spain; the latter is usually greasy, and carelessly cured. The petals of marigold and of safflower are sometimes used to adulterate saffron: but they are detected by infusion in water, when they unfold, and are easily recognised. Saffron, from which a portion of colouring matter has already been extracted, is sometimes fraudulently blended with the genuine drug; it then has a dingy aspect, and yields a paler infusion than it should do. A kind of saffron compressed into cakes is also found in trade; it is very inferior to the former, and is chiefly used as a colouring matter by the confectioners. "The cake saffron, sold in some of the less respectable shops, consists of one part of saffron and nine of marigold, made into a cake with oil, and then pressed; it is sold in considerable quantities for the use of birds when in moult." (Paris. *Pharmacologia.*)

The following are the characters of the best saffron, commonly sold under the name of *Crocus Anglicus*. It is chiefly of a rich and deep orange-red, with a small admixture of paler fibres; when of a remarkably brilliant tint, it appears to have been *doctored*, and does not yield a very deep-coloured infusion; it should be light and dry, for, in consequence of its high price, it is generally offered for sale in as moist a condition as possible; it should be free from fine sand, which is not uncommonly fraudulently mixed with it; its taste is slightly bitter and aromatic, and its odour strong, peculiar, diffusive, and remarkably adhering to the clothes and hair. Its aqueous and spirituous infusions should be of a bright and very deep golden-yellow colour; sulphuric acid renders the aqueous infusion blue, and nitric acid green; with other re-agents it assumes other colours; hence Bouillon la Grange considers it as containing a peculiar variety of extractive matter, which he calls *polychroite*. The following, according to Vogel, are the proximate components of pure saffron:—

Volatile oil	7·5
Wax	0·5
Polychroite	65·0
Gum	6·5
Water	10·0
Woody fibre	10·5
	100

Medical Properties and Preparations of Saffron.—Saffron was formerly regarded as powerfully exhilarating and antispasmodic, and was especially celebrated as an emmenagogue: "in one or two instances," says Dr. Cullen, "I have had some reason to believe in its power of this kind, but in many other instances, though repeatedly employed in large doses, it has entirely disappointed my expectation." From modern practice it has been rejected, as a drug of no powers, and is now chiefly used as a colouring material in several tinctures, in the *Syrup of Saffron*, and in *Aromatic Confection*. The vapour, however, which rises from decoction of saffron, excites considerable irritation in the eyes and nose, and an atmosphere impregnated with the odour of saffron, is to some persons nauseating and overpowering. Syrup of saffron is principally used to give colour, but aromatic confection is a more valuable adjunct, though, as a stomachic stimulant, the saffron may safely be omitted; it adds little to its medicinal efficiency, and greatly to its expense. The large quantity of saffron in the compound tincture of aloes, and its proportion in the compound tinctures of bark, and of rhubarb, are objectionable for the same reason.

SYRUPUS CROCI.	SYRUP OF SAFFRON.
℞ Croci, drachmas decem,	Take of Saffron, ten drachms,
Aquæ ferventis, octarium;	Boiling Water, a pint,
Sacchari, libras tres;	Sugar, three pounds;
Macera crocum in aquâ per horas duodecim, in vase levitèr operto: dein liquorem cola, et saccharum adjice.	Macerate the saffron in the water for twelve hours, in a lightly-covered vessel; then strain the liquor, and add the sugar.

CONFECTIO AROMATICA.	AROMATIC CONFECTION.
℞ Cinnamomi,	Take of Cinnamon,
Myristicæ, singulorum, uncias duas,	Nutmegs, of each, two ounces,
Caryophylli, unciam,	Cloves, an ounce,
Cardamomi, unciam dimidiam,	Cardamoms, half an ounce,
Croci, uncias duas,	Saffron, two ounces,
Cretæ præparatæ, uncias sedecim,	Prepared Chalk, sixteen ounces,
Sacchari, libras duas;	Sugar, two pounds;
Arida simùl in pulverem subtilissimum contere et vase obturato serva. Quotiès autem confectione utendum est, aquam paulatim adjice, donec corpus unum sit.	Rub the dry ingredients together to a very fine powder, and keep them in a close vessel. But whenever the confection is to be used, add water gradually, and mix until they are thoroughly incorporated.

CROTON CASCARILLA, *see* CASCARILLA.

CROTON TIGLIUM, *see* TIGLII OLEUM.

CUBEBA. *Baccæ. Cubebs.* The *berries* of the *Piper cubeba. Cl.* 2. *Ord.* 3. Diandria Trigynia. *Nat. Ord.* Piperaceæ.

This plant is a native of Java. "The younger plants differ from the older; their branches are long, creeping, and rooting; their leaves cordato-lanceolate, attenuated, about one and a half inch in length, and supported on petioles the length of the leaf. In the older plants the branches are flexuose, and tetragonous; the leaves are less than an inch in length, unequal at the base, and supported on channelled footstalks, half an inch in length. The fruit is a berry, growing in clusters." (*Lond. Disp.*)

Cubebs (or Java pepper) much resemble common black pepper in appearance, but each berry has a short stalk attached to it, whence the term *Piper caudatum.* The larger, heavy, and plump berries are to be preferred to the small, light, and shrivelled; they have an aromatic and rather agreeable odour, and a warm bitterish taste, without the biting pungency that belongs to black and long pepper. They contain, according to Vauquelin, a volatile oil and resin, forming a compound not unlike copaiba balsam, together with a coloured resin, extractive, and some salts. According to Thomson, there are two volatile oils, one fluid and the other concrete.

Cubebs are diuretic and aperient: they are administered most effectually in the form of powder, and in doses of from a scruple to one or even two drachms, three or four times a day, in a wine-glassful of water: as proof spirit dissolves the efficacious parts of cubebs, the tincture may also sometimes be employed, especially as an adjunct to the powder:—

TINCTURA CUBEBÆ.	TINCTURE OF CUBEBS.
℞ Cubebæ contritæ, uncias quinque,	Take of Cubebs, in powder, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

One or two drachms of this tincture may be taken at a dose. Cubebs are almost exclusively used as a remedy in gonorrhœa: they generally produce increased secretion of urine, which becomes deep-coloured, and acquires an aromatic odour. They seem to be most advantageously given in the early and acute form of the disease, moderating the pain and suppressing the discharge. According to Mr. Jeffreys, their good effects manifest themselves generally within forty-eight hours after the first dose; but unless material relief be obtained in the course of five or six days, their continued administration is rarely to be recommended: when, however, they fail, the symptoms readily yield to copaiba. Their efficacy in gonorrhœa may be judged of from the following statement of the results of forty cases, treated by Mr. Broughton (*Medico-Chirur. Trans.*, vol. XII).

Cured in two to seven days	10
Cured in eight to fourteen	17
Cured in fifteen to twenty-one	8
Cured in twenty-two to thirty	1
Cured in fifty-five	1
No sensible effect	3

In some cases the adequate dose of cubebs produces flushing and headache, giddiness, quick pulse, and burning sensation of the hands and feet; in others, urticaria, and, according to Dr. Duncan, swelled testicles. Cubebs have been used advantageously in leucorrhœa, and in inflammation of the mucous membrane of the intestines, and spasm of the colon.

In India they are regarded as aphrodisiac. According to Dr. Paris, it is important, during the use of cubebs, to keep the bowels open, for where hardened fæces are allowed to accumulate, the spice insinuates itself into the mass, and produces excoriations in the rectum.

The volatile oil of cubebs is a good diuretic, and may be administered in the form of elœosaccharum.

CUCUMIS COLOCYNTHIS, *see* Colocynthis.

CUPRUM. *Copper.* The name of this metal is derived from the island of Cyprus, where it was first wrought by the Greeks; it has a peculiar reddish colour, much brilliancy, and is very ductile and malleable. Its specific gravity is 8·8. It melts at a dull white heat, being a temperature between the fusing-points of silver and gold; by the joint action of heat and air it becomes superficially oxidized.

There is only one salifiable oxide of copper, which, if considered as a *protoxide*, gives the equivalent of the metal as = 32, and is composed of—

	Atoms.	Equivalents.	Per Cent.
Copper	1	32	80
Oxygen	1	8	20
Oxide of Copper	1	40	100

This oxide is of a black colour, and furnishes blue solutions with the acids; from these it is thrown down, in the form of a bulky blue *hydrate*, by the fixed alkalis, and by ammonia, but it is soluble in excess of the latter alkali, producing a deep sapphire-blue liquid. This blue tint, communicated by addition of ammonia to solutions containing only slight traces of the metal, is a valuable test of its presence; another very delicate test of copper is the ferrocyanuret of potassium, which produces a brilliant brown tint in solutions extremely diluted, and in other cases throws down a rich brown precipitate, which is a ferrocyanuret of copper. The acid solutions of copper are decomposed by the immersion of a plate of clean iron, which becomes coated with metallic copper; and sulphuret of copper is thrown down by sulphuretted hydrogen.

The salts of copper are poisonous, but metallic copper is apparently without deleterious action upon the system; copper coins which have been swallowed, have remained for a long time in the alimentary canal without poisonous influence; and formerly copper filings were used as a vermifuge and remedy for chronic rheumatism. Two cases of halfpence swallowed by children are cited by Dr. A. Thomson; in one the halfpenny remained six months in the intestines, and in the other two months; both were evacuated without having in the smallest degree injured the health, although the impressions on the coins were nearly effaced, and the metal much corroded.

Another case is mentioned by Dr. Paris, of a young woman who swallowed six copper penny-pieces, with a view of destroying herself; she was supposed to be suffering from some visceral disease, but, after the lapse of five years, she voided them, and then confessed the cause of her protracted illness, during the whole course of which, however, no symptom arose in any way attributable to the poisonous influence of copper. Dr. Baillie related a case in which five halfpence were lodged in a pouch in the stomach for a long time, without occasioning mischief.

In all cases of poisoning by copper, therefore, the metal must either be oxidized or salified, and this is in some cases more easily effected than might at first be supposed.

Pure water derives no contamination from long-continued contact with copper filings, but water containing about $\frac{1}{20}$th of common salt, after being boiled in a brass or copper pan, is found to be slightly cupreous; beef, fish, or vegetables, on the other hand, boiled with their usual quantity of salt in the same vessels, are not contaminated; milk, tea, coffee, or beer, boiled for two hours in a perfectly clean copper vessel, contract no impurity; nor does water in which carrots, turnips, cabbage, potatoes, onions, rice, or barley are boiled. If, however, the vessel is not thoroughly clean, or if the article be allowed to remain in it some hours, action may not only ensue, but even to a very great extent. It was at one time customary to boil pickles in copper vessels, or to put halfpence into them, and leave them till they acquired a green colour. In all these cases, the chief action ensues at the edge of the fluid where it is in joint contact of air and the metal; and fat or greasy liquids, and acids, are most energetic in promoting this action. Upon the whole, it is highly desirable that all copper utensils should be banished from culinary use, for even when tinned, they become abraded, and the protection is at best imperfect.

Another article of food, which is occasionally contaminated by copper, is bread; never, I believe, in this country, but in some of the towns of Flanders and France, the bakers add about $\frac{1}{1800}$th part of sulphate of copper to dough, for the purpose of improving the colour of the bread: this quantity, is, it is true, very minute, but its continued introduction into the system may ultimately prove hurtful.

Symptoms and Treatment of Poisoning by Copper.—The symptoms produced by copper poisons depend partly upon their local action on the alimentary canal, and partly on their operation upon distant organs. Orfila found that twelve or fifteen grains of acetate of copper killed dogs within an hour, and that besides the usual symptoms of irritation in the stomach, they often had insensibility, almost always convulsions, and, immediately before death, rigidity, or even absolute tetanus. (CHRISTISON. Art. *Copper.*) Sulphate of copper also proves fatal when applied to wounds. In an experiment made by Dr. Duncan, the animal died in twenty-two hours, and the body was everywhere in a healthy state. According to Orfila, however, acetate of copper produces no such effects. Copper has been found in the blood of animals that have taken it; in that of the carotid artery, but not in the jugular vein, by Lebküchner; and by Dr. Wibmer only in the incinerated residue of the liver.

The symptoms caused by the soluble salts of copper, in man, are stated by Dr. Christison to be generally the same with those caused by arsenic and corrosive sublimate; there are also some peculiarities. The first symptoms are headache, vomiting, pains in the bowels, and afterwards cramps and pains in the legs and thighs: there is also aversion to the smell of copper, and a copper taste in the mouth. Jaundice is also a symptom in some respects peculiar to copper. When the case ends fatally, convulsions, palsy, and insensibility generally precede death; signs, in short, of injury done to the brain. In some cases, narcotic symptoms form the commencement, and irritant symptoms the termination, of the poisoning. Artisans and workmen who employ copper, and are much in contact with it, are stated by Patissier (*Traité des Maladies* *des Artisans*) to have a peculiar appearance, which distinguishes them from other tradesmen, and are said to be liable to painters' colic. Dr. Christison observes, however, that these statements must be received with some limitation, for copper-workers in this country are not generally unhealthy.

The appearances found in the body after death, in cases of copper-poisoning, are those of inflammation of the gullet, stomach, and intestines; the skin is described as having a peculiar yellowness, and in a case of poisoning by verdigris, it was found in the form of powder lining the inside of the stomach, after almost incessant vomiting for three days: too much reliance, however, must not be placed upon a mere green or blue tint of the membranes, for the stomach and its contents have been observed to acquire these tints in consequence of natural disease. Sugar, white-of-egg, iron-filings, and ferrocyanuret of potassium, are represented as antidotes to the poisonous effects of copper. Vinegar is decidedly injurious.

Preparations and Uses of Copper.—Sulphate of copper (*Cupri sulphas*) has a place in the Materia Medica of the present Pharmacopœia, and the *Ammonio-sulphate* is among the Preparations. The diacetate of copper, or verdigris, has already been described. *See* ÆRUGO.

Sulphate of copper, called also *Roman*, or *blue vitriol*, and *salt of Venus*, is obtained by dissolving oxide of copper in dilute sulphuric acid; sometimes it is procured by the action of sulphuric acid on chloride of copper; or by the decomposition of sulphate of silver by plates of copper: the latter process is limited to the refiners. It crystallizes in rhombic prisms, of a fine blue colour, soluble in about 4 parts of water at 60°, and in 2 parts at 212°. When heated, it loses water of crystallization, and crumbles into a white anhydrous sulphate, composed of—

	Atoms.	Equivalents.	Per Cent.
Oxide of copper	1	40	50
Sulphuric acid	1	40	50
Anhydrous sulphate of copper	1	80	100

The crystallised salt contains—

	Atoms.	Equivalents.	Per Cent.
Oxide of copper	1	40	32
Sulphuric acid	1	40	32
Water	5	45	36
Crystallised sulphate of copper	1	125	100

Sulphate of copper is a powerful and rapidly-acting emetic; it is chiefly useful where the stomach has been paralysed by narcotic poisons. In cases of over-dose of opium, it will often occasion vomiting where other emetics are ineffectual. The best mode of administering it is to dissolve half a drachm in six ounces of water, a third part being taken every ten or fifteen minutes, until it operates. It has also been used as an emetic in the early stages of phthisis, and in croup. In very small doses, it is sometimes prescribed as a tonic, especially in certain cases of epilepsy, and in diarrhœa, chronic dysentery, and alvine hæmorrhages.

> ℞ Cupri Sulphatis, gr. iij.
> Medullæ Panis, ʒj.
> Fiat massa in pilulas xxiv. dividenda, quarum capiat æger unam ter quaterve in die.

Even in these small doses, however, if persevered in, it is apt to excite spasmodic pains of the stomach, an effect which may generally be counteracted by the addition of a quarter of a grain of opium to each pill.

In obstinate intermittents, two grains have been given twice a day, with half a grain of opium, with manifest advantage; but it is a remedy which should not be resorted to on trifling occasions.

Externally, sulphate of copper is a useful escharotic, and, properly diluted, it is sometimes applied advantageously to foul and indolent ulcers, or as a styptic in hæmorrhage. In ulcerated sore throat, where there is no material constitutional affection, the sores may generally be made to heal by touching them two or three times a day with a camel-hair pencil, moistened with the following solution:—

> ℞ Oxymel, f℥ss.
> Cupri Sulphatis, gr. v. M.

A very dilute solution of sulphate of copper is sometimes used as an ophthalmic lotion. "In the proportion of half a drachm to eight ounces of rose-water, it forms a lotion which has been found very efficacious in phagedenic ulcers of the face, and in allaying itching when attended with erysipelatous inflammation about the anus." (Paris. *Pharmacologia.*) Bate's *Aqua Camphorata* was a favourite eye-wash of the late Mr. Ware, especially in the purulent ophthalmia of infants. The following was his formula:—

> ℞ Cupri Sulphatis,
> Boli Gallici, āā gran. xv.
> Camphoræ, gran. iv.
> Solve in aquæ ferventis ℥iv. et dilue cum aquæ frigidæ octariis iv. cola ut fiat collyrium.

Cupri Ammonio-Sulphas.	Ammonio-Sulphate of Copper.
℞ Cupri Sulphatis, unciam,	Take of Sulphate of Copper, an ounce,
Ammoniæ Sesquicarbonatis, unciam cum semisse;	Sesquicarbonate of Ammonia, an ounce and a-half;
Tere simul, donec acidum carbonicum exire cessaverit; deindè cupri ammonio-sulphatem, chartâ bibulâ involutam in aëre exsicca.	Rub them together till carbonic acid shall have ceased to be evolved; then dry the ammonio-sulphate of copper, wrapped in bibulous paper, in the air.
Liquor Cupri Ammonio-Sulphatis.	**Solution of Ammonio-Sulphate of Copper.**
℞ Cupri Ammonio-Sulphatis, drachmam,	Take of Ammonio-Sulphate of Copper, a drachm,
Aquæ destillatæ, octarium;	Distilled Water, a pint;
Cupri ammonio-sulphatem in aquâ liqua, et cola.	Dissolve the ammonio-sulphate of copper in the water, and filter.

During the mutual action of the sulphate of copper and sesquicarbonate of ammonia, carbonic acid is evolved, and carbonate of copper and sulphate of ammonia are formed, which, together with the undecomposed sesquicarbonate of ammonia, constitute the *ammonio-sulphate of copper.* It has an ammoniacal odour, a fine blue colour, and a styptic and metallic taste; it is liable to vary in composition, in consequence of the retention of more or less of the sesquicarbonate. The aqueous *solution* is of a fine blue colour, but, unless some excess of sesquicarbonate of ammonia is retained, it gradually deposits oxide of copper.

The *ammonio-sulphate of copper* is placed by writers on the Materia Medica in the list of tonics and antispasmodics. It has been recommended in epilepsy, and is usually tried in obstinate cases of that disorder; from one to five grains are given twice or thrice a day, in the form of pill; in consequence, however, of its uncertain composition, it is not well adapted for internal use. It is said to have been given with advantage in chorea, after a course of purgatives; but in this disease sulphate of copper, sulphate of zinc, vegetable antispasmodics, and cold bathing, are remedies more to be relied upon.

The *solution of ammonio-sulphate of copper* is stimulant and astringent, and among the applications which sometimes induce indolent ulcers to assume healthy actions and ultimately cleanse and heal them; but it frequently irritates, and appears to possess no real advantage over solution of sulphate of copper. It has also been extolled as a stimulant for the cornea, when threatened with specks and opacity; to say nothing, however, of the variability of the ammonio-sulphate itself, the tendency of its dilute aqueous solution to deposit oxide, is a serious objection to its employment.

CURCUMA. *Turmeric.* The rhizoma of the *Curcuma longa. Cl.* 1. *Ord.* 1. Monandria Monogynia. *Nat. Ord.* Zingiberaceæ.

This plant is a native of the East Indies; it has an oblong, tuberous root, about the thickness of the finger; the leaves are palmated, broad, lanceolate, subsessile on their sheath, seriaceous underneath, and of an uniform green. The scape rises from the leaves, and is naked, and terminated by a cylindrical truncated lateral spike of flowers. It blossoms in April and May.

The tubers of the best turmeric are one or two inches in length, plump, firm, and dense, and of a gray colour externally, and deep orange within. They are almost always more or less worm-eaten. They have a peculiar odour, and a warm, bitterish taste, and impart a yellow colour, and a deep orange tint to alcohol. They contain, according to the analysis of John, 1 per cent. of volatile oil, 11 of yellow resin, 12 of yellow extractive, 14 of gum, 57 of woody fibre, together with a substance soluble in potassa, and 6 of water. The yellow colouring matter of turmeric is rendered deep-brown by the alkalis; hence its use for test-paper.

Turmeric was formerly in repute as a tonic and carminative, but it has fallen into disuse, and seems needlessly reintroduced. From five to twenty grains of the powder have been given twice a day in flatulent cholic; it is an ingredient in currie-powder, and other articles of oriental cookery. The natives of India sprinkle its powder upon foul ulcers.

CUSPARIA. *Cortex.* The *bark* of the *Galipea Cusparia.* *Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Rutaceæ.

This bark was originally introduced into the Materia Medica by my father, in the year 1778, under the name of *Angustura Bark*, and in 1791 he published an essay upon it. Upon the authority of M. St. Hilaire, it is represented as the produce of a species of *Galipea*, for which the specific name *Cusparia* has been adopted; it is represented elsewhere as the produce of *Cusparia febrifuga*, and of *Bonplandia trifoliata.*

The *Galipea Cusparia* is a native of South America; it is an evergreen tree, covered with gray bark, and branching towards the summit; the leaves are arranged alternately, and consist of three oblong, ovate-pointed leaflets, attached at their bases to a single channelled petiole, ten to twelve inches long. The inflorescence is a terminal raceme, composed of alternate peduncles, each bearing from three to six flowers; the calyx is inferior, persistent, five-toothed and tomentose; the corolla is funnel-shaped, and composed of five petals, united below so as to appear as one tube. The stamens are shorter than the tube, and have white filaments supporting yellow anthers; the pistil is formed of five oval ovaries, from which a fleshy style rises supporting five fleshy stigmas. The fruit consists of five oval bivalve capsules, each inclosing one seed.

This bark is imported from South America, and is generally packed in casks; the original package consisted of large palm leaves, and a network of sticks. It is both in flat and quilled pieces; it breaks with a short resinous fracture. It is covered with an ash-coloured epidermis, and is internally smooth, and of a dull, brown colour. A spurious and poisonous bark, probably that of one or more of the species of *Strychnos*, is sometimes met with under the name of *Angustura;* it is more intensely bitter, in shorter and less regular pieces than the genuine; internally nearly black, and externally covered with a rough, rust-coloured, and spotted epidermis.

Cusparia bark is bitter flavoured, accompanied by a peculiar and somewhat aromatic pungency. Its odour, especially when fresh from the package, is rather nauseous and fishy. It is easily pulverisable. Its chemical nature has not been accurately determined. I have failed in endeavouring to obtain from it a salifiable base, though it appears to contain a peculiar alkaloid, for when triturated with caustic potassa, it exhales ammonia.

According to Dr. A. T. Thomson (*Lond. Disp.* Art. GALIPEA), "its active matter is taken up by cold and hot water in infusion, and is not injured even by coction, but the addition of alcohol precipitates part of the extractive. The alcoholic tincture reddens litmus paper, and becomes milky on the addition of water. The watery infusion precipitates the infusion of galls and of yellow cinchona, but not gelatine. It precipitates sulphate of iron, tartarised antimony, diacetate and acetate of lead, bichloride of mercury, and pure potassa. Nitrate of silver also precipitates it yellow, but assumes a violet colour after some time. Sulphate and ammonio-sulphate of copper precipitate it green; ammonia deepens its colour, but forms no precipitate. Sulphuric acid gives the infusion a brown colour, and gradually a lemon-yellow precipitate is deposited. Muriatic acid does not affect it. Sulphuric ether takes up one part from ten of the powder, and when evaporated on water, leaves a greenish-yellow very acrid resin, and renders the water milky. The addition of nitro-muriatic acid changes this milky appearance to red, slowly producing a lemon-yellow precipitate, and giving the resin on the side of the glass a brownish-pink colour. By distillation with water, the bark yields a small portion of a white essential oil.

These experiments ascertain the substances which are incompatable in prescriptions with infusion or tincture of cusparia bark, and show that it contains *resin*, a peculiar variety of *extractive*, *carbonate of ammonia*, *volatile oil*, and igasuric acid, which I was inclined to think was in combination with cinchonia; but Saladin has investigated the subject, and asserts that it is a new alkali, which he has termed *Cusparin:* it is procured by acting upon the infusion (query, extract?) of cusparia bark by absolute alcohol, and leaving it to spontaneous evaporation. The crystals procured are four-sided, melt at a low temperature, and lose 3·09 per cent. of weight. Water at 60° dissolves only 0·5 per cent., and at 212° 1 per cent. They dissolve in acids and alkalis, and are precipitated by infusion of galls.

According to Fisher, 100 parts of this bark contain—

Volatile oil	0·3
Bitter extractive (Angusturia) . .	3·7
Bitter resin and elastic resin . . .	3·8
Gum	5·7
Woody fibre	86·5

Cusparia is a valuable tonic, especially in cases of dyspepsia, with diarrhœa and loss of appetite. It may be given in powder, in doses of ten grains twice or thrice a day, or in infusion, or decoction. In cases of flatulency, attended by nausea, five grains, with the same weight of rhubarb, taken an hour before dinner, will often restore appetite and digestion. It is particularly useful in dysentery and chronic diarrhœa, especially that form of diarrhœa to which persons who have resided in warm climates are frequently subject, and which often assumes, even in this country, more or less of a dysenteric character. It may be conjoined in such cases with some aromatic, such as *Pulvis Cinnamomi compositus*, or *Pulvis Cretæ compositus*, or given as follows:—

℞ Cuspariæ contusæ, ℥j.
Caryophilli, ʒj.
Aquæ ferventis, octarium;
Macera per horas sex et cola.

℞ Colaturæ, f℥iss.
Tincturæ Catechu,
Syrup. Aurantii, āā fʒss.
M. Ter vel quater quotidie sumendus.

In the cure of intermittents, cusparia does not come into competition with cinchona; but in mixed and nervous fevers, and generally as a tonic, it is less apt to disagree with the stomach and bowels: it admits, in these cases, of the usual combinations with saline, aromatic, and antispasmodic medicines. The following is the only officinal formula of the Pharmacopœia:—

Infusum Cuspariæ.	Infusion of Cusparia.
℞ Cuspariæ contusæ, drachmas quinque,	Take of Cusparia, bruised, five drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours, in a lightly-covered vessel, and strain.

CYANOGEN (from κυανος, *blue*, and γεννειν, *to produce*). *Bicarburet of Nitrogen.*

This gaseous compound was discovered by Gay-Lussac, in 1815. It is obtained by heating *cyanuret of mercury.* It is condensible into a liquid by a pressure of between three and four atmospheres, at a temperature of 45°. It has a pungent odour, somewhat resembling that of bitter almonds, and is unrespirable and poisonous. It burns with a beautiful purple flame, and when detonated with twice its volume of oxygen, it produces two volumes of carbonic acid and one of nitrogen. Its specific gravity, compared with hydrogen, is as 26 to 1. Compared with atmospheric air, its specific gravity is as 1·81 to 1·00. Combined with hydrogen, it constitutes the *hydrocyanic acid* (which see). Cyanogen consists of—

	Atoms.	Equivalents.	Per Cent.
Carbon	2	12	46·1
Nitrogen	1	14	53·9
Cyanogen	1	26	100·0

CYATHUS (κυαθος, *a drinking cup*). A *wine-glass.* This measure is considered equivalent to about a fluid ounce and a half.

CYDONIA. *Semina.* Quince Seeds. The *seeds* of the *Cydonia vulgaris. Cl.* 12. *Ord.* 1. Icosandria Pentagynia. *Nat. Ord.* Pomaceæ.

This tree, originally from Cydon, in Crete, but now commonly cultivated in our gardens, is generally rather low and distorted, sending off several branches, and covered by a brown bark; the leaves are simple, oval, entire, green on the upper and whitish on the under side, standing on short footstalks; the flowers are large, solitary, pink or whitish, and placed close to the axillæ of the leaves; the calyx consists of one leaf, divided into five oval notched segments; the corolla consists of five convex roundish petals, notched at their extemities; the filaments are about twenty, tapering, shorter than the corolla, inserted into the calyx, and furnished with simple anthers; the germen is orbicular; the styles are five, slender, nearly as long as the filaments, and supplied with simple stigmata; the fruit is divided at the centre into five membranous cells containing the seeds, which are oblong, angular, pointed at one end, and blunt at the other, compressed, and covered with a brown pellicle.

Quince seeds abound in an insipid mucilage, which is extracted by decoction with water; a viscid solution is thus obtained, which has no important pharmaceutical applications, and which, in warm weather, soon decomposes, so that, if used, it should always be freshly prepared, and kept in a cool place. It has been prescribed as an application to erysipelatous and excoriated surfaces, as a vehicle for borax in aphthous affections of the mouth, and as a soothing lotion in inflammation of the eye.

Decoctum Cydoniæ.	Decoction of Quince Seeds.
℞ Cydoniæ, drachmas duas,	Take of Quince Seeds, two drachms,
Aquæ destillatæ, octarium;	Distilled Water, a pint;
Coque lento igne per sextam horæ partem; dein cola.	Boil over a slow fire for ten minutes, then strain.

CYMINUM. *Fructus. Cumin Seed.* The fruit of the *Cuminum Cyminum. Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This plant is a native of Egypt and Ethiopia; but the European market is chiefly supplied with it from Sicily and Malta, where it is abundantly cultivated for medical and culinary purposes. The root is annual, simple, fibrous; the stalk round, slender, branched, sometimes procumbent, or six or eight inches high; the leaves are narrow, linear, pointed; the flowers purple, and produced in small umbels, usually composed of four radii, each supporting a partial umbel of the same number; the involucra consist of four narrow-pointed segments; all the florets are fertile; the corolla consists of five petals, which are unequal, bend inwards, and notched at the apex; the five filaments have simple anthers; the germen is large, ovate, and placed below the corolla; the styles are minute and terminated by simple stigmas; the fruit is oblong, striated; the two seeds are oblong and flat on one side, convex and striated on the other.

Cumin seed has a peculiar and rather nauseous odour, and a bitter, warm, and disagreeable taste. It contains gum, resin, and a volatile oil having the odour and flavour of the seed. Water acquires its odour, but alcohol is the best solvent of its active parts; the tincture leaves, on evaporation, a powerful extract. Some kinds of cheese, much esteemed in Switzerland, are flavoured with cumin seed, and it forms an ingredient in currie-powder; to most persons, however, its taste and smell are disagreeable. As a medicine it is said to be stomachic and carminative, and to have some peculiar virtues as a stimulant in promoting the absorption of indolent tumours. The *Emplastrum Cumini* is, however, properly omitted, as an unnecessary formula, in the present Pharmacopœia: there seems to be no good reason, under these circumstances, for retaining the seed. It was formerly supposed to produce a pallor of countenance, and, according to Pliny, the disciples of Portius Latro, a celebrated teacher of oratory, used cumin to acquire the paleness which their master was supposed to have contracted by his studies.

CYNIPS QUERCIFOLII. A hymenopterous insect, whose habitation forms the gall-nut of the oak. *See* Gallæ.

CYNOSBATUS (*κυνος*, *a dog*, and *βατος*, *a bramble*). The *dog rose.* The *Conserva Cynosbati* of former Pharmacopœiæ is now termed *Confectio Rosæ Caninæ. See* Rosa Canina.

DAPHNE MEZEREUM, *see* Mezereum.

DATURA STRAMONIUM, *see* Stramonii Folia.

DAUCI FRUCTUS ET RADIX RECENS. The *fruit* and *fresh root* of the *Daucus carota. Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

The fruit or seed of the *wild carrot*, and the root of the *cultivated carrot*, have been generally specified as the officinal varieties.

The carrot is an indigenous biennial, found in considerable abundance on pasture lands; it is extensively cultivated for domestic use. Its root is spindle-shaped, fleshy, yellow; the stalk is round, erect, branched, furrowed, hairy, and about two feet high; the leaves are pinnated, deep green, hairy, and stand upon footstalks nerved on the under side; the umbels, which are composed of several radii, form a flat surface at top while in flower, but become drawn in and concave when the seeds ripen; the general involucrum consists of several leaves, cut into long narrow segments; the corolla consists of five petals, of which the outermost is the largest; they are white, heart-shaped, and bent inwards; the five filaments are capillary, and furnished with simple anthers; the germen is small, and supports two reflexed styles, terminated by blunt stigmas; the seeds are two, egg-shaped, convex, rough on one side, covered with strong hairs, and flat on the other. It flowers from June to August.

The root of the cultivated carrot, when well boiled, and rubbed into a pulp, is often a soothing application in the form of poultice, to irritable and ill-conditioned ulcers. The seeds have been recommended as diuretic, in cases of gravel: they are aromatic and antiflatulent, but not of sufficient importance to retain a place in the Pharmacopœia.

DECOCTIONS (decoquo, *I boil away*).

These preparations, as the name imports, are obtained by boiling vegetable substances in water, an operation which is requisite when mere infusion is inadequate to the abstraction of their active principles; in many cases, however, there are objections to the process: the continued application of heat frequently modifies or decomposes some of the substances present; volatile matters, upon which much of the activity of remedies often depends, are dissipated; and substances retained in the solution whilst hot, precipitate as it cools. Where the object is to separate difficultly soluble mucilaginous substances, and principles which are neither volatile nor changeable at the temperature of boiling water, the process is often effectual and unobjectionable.

In the preparation of decoctions, the boiling should not be continued longer than is absolutely necessary for the extraction of the soluble matters, and they should be strained while hot, lest their active parts should be deposited and left on the strainer. Common saucepans, which should be rather deep than shallow, are generally used in preparing these decoctions: and the vegetable substances should either be sliced or bruised, so as to facilitate the action of the solvent, without at the same being so finely divided as to pass through the strainer.

In the greater number of decoctions there is held in solution a portion of extractive matter, and frequently of astringent matter, or tan; acids and other peculiar vegetable principles are also often present, and in many of them a large relative proportion of mucilage; hence the greater number of metallic salts are said to be *incompatible* with them, that is, to occasion change of colour, or precipitation; but it by no means follows, that because the metallic oxide enters into new combinations, it is therefore rendered inert; nor are we always to conclude that substances are medically incompatible, because they are chemically so. All decoctions should be prepared either with distilled, or, at all events, with soft, water, for the saline ingredients of hard water may in some cases materially interfere with their efficacy; they should always be employed fresh, for, when kept, most of them are liable to decomposition.

The following are the *Decoctions* in the present Pharmacopœia:—

Decoctum Aloes Compositum .	Compound Decoction of Aloes, *see* ALOES.
Decoctum Amyli	Decoction of Starch, *see* AMYLUM.
Decoctum Cetrariæ . . .	Decoction of Liverwort, *see* CETRARIA.
Decoctum Chimaphilæ . . .	Decoction of Pyrola, *see* CHIMAPHILA.
Decoctum Cinchonæ Cordifoliæ .	Decoction of Heartleaved Cinchona, *see* CINCHONA.
Decoctum Cinchonæ Lancifoliæ .	Decoction of Lanceleaved Cinchona, *see* CINCHONA.
Decoctum Cinchonæ Oblongifoliæ	Decoction of Oblongleaved Cinchona, *see* CINCHONA.
Decoctum Cydoniæ . . .	Decoction of Quince Seeds, *see* CYDONIA.
Decoctum Dulcamaræ . . .	Decoction of Woody Nightshade, *see* DULCAMARA.
Decoctum Granati . . .	Decoction of Pomegranate, *see* GRANATUM.
Decoctum Hordei . . .	Decoction of Barley, *see* HORDEUM.
Decoctum Hordei Compositum .	Compound Decoction of Barley, *see* HORDEUM.
Decoctum Malvæ Compositum .	Compound Decoction of Mallow, *see* MALVA.
Decoctum Papaveris . . .	Decoction of Poppy, *see* PAPAVER.
Decoctum Quercus . . .	Decoction of Oak Bark, *see* QUERCUS.
Decoctum Sarzæ	Decoction of Sarsaparilla, *see* SARZA.
Decoctum Sarzæ Compositum .	Compound Decoction of Sarsaparilla, *see* SARZA.
Decoctum Scoparii Compositum .	Compound Decoction of Broom, *see* SCOPARIUM.
Decoctum Senegæ . . .	Decoction of Senega, *see* SENEGA.
Decoctum Tormentillæ . .	Decoction of Tormentil, *see* TORMENTILLA.
Decoctum Ulmi	Decoction of Elm Bark, *see* ULMUS.
Decoctum Uvæ Ursi . . .	Decoction of Whortleberry, *see* UVA URSI.
Decoctum Veratri . . .	Decoction of White Hellebore, *see* VERATRUM.

DEMULCENTS (demulceo, *I soften*). Medicines which protect parts from the action of acrid substances or secretions, and which are generally themselves inert and viscid. Thus the tracheal irritation in catarrh is soothed by gum, sugar, liquorice; intestinal irritation by oily and mucilaginous remedies, &c. Demulcents are sometimes supposed to act sympathetically or indirectly; as when mucilaginous drinks are prescribed in cases of irritation of the urinary organs, as in gravel, gonorrhœa, &c.: here they are probably only useful as *diluents:* upon this principle, almond emulsion is often administered to prevent the excitement of those parts which sometimes follows the external application of cantharides in the form of a blister plaster.

DENTIFRICE (dentes, *the teeth*, and frico, *I rub*). Remedies employed for cleansing the teeth and gums. Tooth-powders generally act mechanically, and should be of such a nature as to cleanse the teeth without injuring the enamel; chalk, charcoal, bole, cuttle-fish, and other similar substances in fine powder act upon this principle: a mixture of two parts of chalk and one of well-burned charcoal, in fine powder, forms an excellent dentifrice, but its blackness is sometimes objected to. Pumice-stone, which is an ingredient in some tooth-powders, is objectionable, as, from its hardness, it scratches the enamel of the teeth. Myrrh, cinchona, catechu, alum and other astringents, are occasionally added to dentifices, with a view of strengthening and corrugating, as well as cleansing the gums; and tincture of myrrh, bark, and catechu, are sometimes employed, diluted with water, upon the same principle. The ingredients of tooth-powder are sometimes mixed with syrup, honey, and other viscid materials, into a kind of electuary, or *tooth-opiate;* and red bole, cochineal with a little alum, powdered pomegranate flowers, and other red colouring matters, are often added for appearance sake, and, according to some, for the purpose of improving the colour of the gums.

DEPILATORY (de, *from*, and pilus, *hair*). An application for the removal of hair. The celebrated *Turkish Depilatory* is a compound of one part of yellow sulphuret of arsenic and seven of quick-lime, well mixed and in fine powder. The quick-lime is the essential ingredient, and is alone effectual; it is occasionally used by ladies who are troubled with beards, and should be applied with a camel-hair brush, made into a thin paste with water; it may remain on till it excites a tingling sensation of the face, and should then be wiped off with a soft sponge and warm water, when the greater part of the hair is removed with it; two or three applications are generally sufficient to produce the desired effect.

"Delcroix's *Poudre Subtil, for removing superfluous hairs in lses than ten minutes:* this fashionable depilatory appears, upon examination, to consist of quick-lime and sulphuret of arsenic, with some vegetable powder; it is, however, so unequally mixed, that, on submitting it to analysis, no two portions afforded the same results. It can scarcely be necessary to state, that such a composition is incapable of fulfilling the intention for which it is so confidently vended." (*Pharmacologia.*)

DIACETAS CUPRI, *see* ÆRUGO.

DIGITALIS FOLIA ET SEMINA. The *leaves* and *seeds* of the Foxglove. *Digitalis purpurea. Cl.* 14. *Ord.* 2. Didynamia Angiospermia. *Nat. Ord.* Scrophulariaceæ.

This is a common indigenous biennial plant growing in gravelly soils; in July it produces its bell-shaped flowers, bearing a resemblance to a finger of a glove, whence the term *Digitalis*, first applied to it by Fuchsius, (*Plantarum omnium Nomenclatura*, 1541,) from the German *Fingerhut.* It had been previously described under the name of *Campanula sylvestris.* The root of the foxglove is biennial, branched, and fibrous; the stalk simple, erect, tapering, covered with fine hair, and rising four or five feet; the leaves are large, oval, serrated, veined, downy, and stand on short footstalks; the calyx consists of five segments, which are elliptical, pointed, ribbed, and the upper segment narrower than the others; the flowers grow in a long terminal spike; they are large, monopetalous, pendulous, bell-shaped, purple, and dotted on the inside; the tubular part swells near the base, and opens at the limb into four irregular, short, obtuse segments, of which the uppermost is shortest and truncated; the peduncles are round, short, villous, and bend downwards; the filaments are white, crooked, inserted in the bottom of the tube, and crowned with large yellow anthers; the style is simple; the stigma bifid; the germen oval; the capsule bilocular, containing many blackish seeds.

The *leaves* are the part chiefly employed in medicine; they have scarcely any smell, but a bitter and slightly nauseous flavour. They should be gathered just as the plant is about to blow, and those which are not perfectly healthy should be rejected; the footstalks and the thick part of the rib of the leaves should be pulled off; and they should be carefully and separately dried at a temperature not exceeding 212°, so as to retain their colour, and appear of a tolerably lively green when powdered; they should not be tied in bundles, or of a black colour, as they commonly occur in the herb shops.

The virtues of the leaves of digitalis are extracted both by alcohol and water. The watery infusion is of a pale olive colour. "It does not precipitate solutions of galls, tartarized antimony, or sulphate of iron; the last only deepens its colour, but it precipitates infusion of yellow cinchona bark, produces a yellowish precipitate with bichloride of mercury, and a blackish-violet very copious one with nitrate of silver. The dry powder, which should have a beautiful green colour, moistened and triturated with lime or calcined magnesia, and a glass rod dipped in hydrochloric acid held over it, exhibits copious white fumes, proving the presence of ammonia. The presence of ammonia is also apparent in the tincture, which is rendered milky by water. Destouches, a French chemist who analysed foxglove, obtained also much carbonate of ammonia, by distilling the watery extract. Ten grains of the powder macerated in half a fluid-ounce of sulphuric ether lost three grains of its weight and yielded all its colour to the ether, and the ethereal tincture, on being evaporated on water, left a pellicle of a dark-green, unctuous, resinous matter, whilst some yellowish extractive was dissolved in the water, and precipitated afterwards by chlorine." (*Lond. Disp.*) From this analysis Dr. A. T. Thomson concludes that foxglove contains ammonia, extractive, and a pea-green resinous matter in which its narcotic power resides. Leroyer has given a process for separating the active principle of digitalis, which, from the experiments of Prevost, appears to be a crystallizable alkaloid, but its characters have not as yet been accurately defined.

The medical powers of foxglove require to be considered under two points of view, namely, as a sedative, and as a diuretic.

As a *sedative* its powers seem to be distinct and peculiar, and to act more *directly* as such than any other article of the Materia Medica; for we perceive no previous stimulation, nor are those other symptoms produced which usually attend the operation of narcotics. In this opinion Dr. Paris coincides: " It is directly sedative (although some maintain the contrary opinion), diminishing the pulse and the general irritability of the system, and increasing the action of the absorbents, and the discharge by urine. The effects appear to be in a great degree connected with its sensible influence on the body, which is indicated by feelings of slight nausea and languor; accordingly, every attempt to prevent these unpleasant effects, or to correct the operation of digitalis by combining it with aromatic and stimulant medicines, seems to be fatal to the diuretic powers of the remedy."

The effects of digitalis upon the heart and arteries are remarkable, and deserving of serious attention. Where the pulse is full, hard, and frequent, it generally reduces the fulness and hardness, and then the quickness. Dr. Baildon brought down his own pulse from 110 to 40 beats in a minute. In a patient in St. George's Hospital, suffering under acute rheumatism, a very full, strong, and rapid pulse, of 130 in a minute, was first rendered soft and compressible, and afterwards fell, in the course of six hours, to 60 beats in the same period. In a patient suffering under phthisis, the pulse was lowered in forty-eight hours from 125 to 45 beats in a minute. But this remarkable effect upon the pulse is attended by other symptoms. Upon any sudden, and often even trifling exertion, the pulse quickens, the heart throbs, nausea and fainting come on; and persons under the full influence of digitalis have died suddenly under such circumstances. Dr. Baildon found that, when his pulse had been reduced to 40 beats in a minute, if he merely assumed the erect posture, it would rise to 100; when sitting up in a chair it was 72: the same effect, he says, was produced upon several other persons. (*Edin. Med. and Surg. Journ.* III. 271.) The consumptive patient above adverted to got up in bed, in consequence of being suddenly seized with nausea, and his pulse, which half an hour before was 45, became too quick to count: he then fainted, and some ammoniacal stimulants were administered for his recovery, after which scarcely any pulse could be felt; it was alarmingly slow and feeble. A dropsical woman, 65 years of age, under the full influence of digitalis, fell in a fainting fit on walking across the room; she showed appearances of recovery, but vomiting and fainting came on again, and she died. I relate these from among similar cases, taken from notes made at the clinical lectures of the late Dr. Pemberton, at St. George's Hospital, to show the necessity of precaution in the use of digitalis, and the care which persons require under its influence. It was formerly incautiously used as a diuretic, without much reference to its sedative power; and such cases as the above, of fainting fits frequently recurring, and of sudden death, were not of very uncommon occurrence. When such symptoms come, as they sometimes do, suddenly on, they are best treated by small doses of ammonia and ether; paying, at the same time, the utmost attention to the quiet of the patient, who should not be allowed to sit erect in bed, or to attempt to get up.

Some writers have ascribed a stimulant power to digitalis, and have considered it as only indirectly sedative, and have represented it as first quickening and filling the pulse and afterwards weakening the force of the vital functions; but I have not met with any well authenticated cases of the kind; in general, indeed, the remarkable effects of digitalis, as a sedative, are unattended by other prominent symptoms. The skin is not dry, nor is thirst complained of; the pulse occasionally may intermit; but that decided effect upon the brain which narcotics in full doses produce, is never eminently shown by digitalis.

The poisonous effects of digitalis upon animals have been described by Orfila; his experiments were made with the powder, extract, and tincture: in moderate doses it produced giddiness, languor, vomiting, and death in twenty-four hours; in larger doses, tremors, convulsions, stupor, and coma were superadded. It is also active when injected into a vein, or applied to a wound. Dr. Christison enumerates the following as the effects of an overdose in man: great nausea, frontal headache, sense of disagreeable dryness in the gums and pharynx, some salivation, giddiness, weakness of the limbs, feebleness and increased frequency of the pulse; in a few hours an appearance of sparks before the eyes, and, subsequently dimness of vision and a feeling of pressure on the eye-balls. *These effects may be occasioned by so small a dose as two or three grains of good foxglove.* (Schroek, *de Digitali purpurea*, 1829.)

Digitalis is liable, like some other poisons, to accumulate in the system when it has been long used in moderate doses, and at length to produce constitutional effects, even after it has been discontinued. The symptoms of its gradual accumulation are, in the slighter cases, nausea, vomiting, giddiness, want of sleep, sense of heat throughout the body, and of pulsation in the head, general depression, sometimes diarrhœa, sometimes salivation, and for the most part profuse sweating. In more urgent cases convulsions also occur, and it appears from a case mentioned by Dr. Blackall, that the disorder thus induced may prove fatal. One of his patients, while taking two drachms of the infusion of the leaves daily, was attacked by pain over the eyes and confusion, followed in twenty-four hours by a profuse watery diarrhœa, delirium, general convulsions, insensibility, and an almost complete stoppage of the pulse. "Although some relief was derived from an opiate clyster, the convulsions continued to recur in frequent paroxysms for three weeks; in the intervals he was forgetful and delirious, and at length died in one of the convulsive fits." (Blackall *on Dropsy*.)

The following cases, exemplifying the effects of single large doses of digitalis, are also referred to by Dr. Christison. An old woman drank ten ounces of a decoction made from a handful of leaves, in a quart of water. She grew sick in the course of an hour, and for two days had incessant retching and vomiting, with great faintness and cold sweats in the intervals, some salivation and swelling of the lips, and a pulse feeble, irregular, intermitting, and not above 40. She had also suppression of urine for three days. (*Edin. Med. and Surg. Journ.* VII. 149).

The following instance is from the *Journal de Médecine* (Novembre, 1817). A man, 55 years old, took by mistake a drachm, instead of a grain, for asthma, and was attacked in an hour by vomiting, giddiness, excessive debility, so that he could not stand, loss of sight, cholic, and slow pulse. These effects continued more or less for four days, when the vomiting ceased, and the other symptoms then successively disappeared; the vision however remained depraved for nearly a fortnight.

The following fatal case arose from an overdose administered by a quack doctor, and became the ground of a criminal trial in 1826. (*Edin. Med. Journ.* XXVII. 223, and *Morning Chronicle Newspaper,* October 30 and 31, 1826.) "Six ounces of strong decoction were taken as a laxative early in the morning. Vomiting, cholic, and purging were the first symptoms; towards the afternoon lethargy supervened; about midnight the cholic and purging returned; afterwards general convulsions made their appearance, and a surgeon who saw the patient at an early hour of the succeeding morning, found him violently convulsed, with the pupils dilated and insensible, and the pulse slow, feeble, and irregular. Coma gradually succeeded, and death took place in twenty hours after the poison was swallowed." The morbid appearances after death are stated to have been redness of some parts of the inner coat of the stomach, and the external membranes of the brain were much injected with blood.

As a *diuretic*, digitalis is chiefly useful in conjunction with other remedies, especially with squills and mercurials: it has been much extolled in dropsical affections, and it is certain that other diuretics are more effective in that peculiar state of the system which digitalis induces, and which I have above described: but its depressing and dangerous influence must in these cases never be lost sight of. I knew an instance of a person who suffered under anasarca of the legs, and who applied for relief at a dispensary, where he received a box of pills, one of which he was directed to take three times a day. On the evening of the third day, he complained of debility and faintness, and in the course of the night vomiting and fainting fits came on; in the morning he died, upon attempting to get out of bed. This was apparently a case, perhaps a peculiar one, of poisoning by digitalis; it shows the risk of carelessly administering it, and the necessity of attending to those peculiarities of habit which sometimes seem to render the system particularly open to its lowering and sedative influence. The pills were composed of two grains of digitalis, one of squills, and half a grain of calomel.

The singular effect of digitalis upon the pulse suggests its trial in inflammatory diseases, where bleeding has been carried to as great an extent as is consistent with safety, without effecting that reduction of symptoms which might have been hoped for. The question here is, how far the reduction in fulness and frequency of pulse which digitalis produces, is equivalent, where inflammation is going on, to the same effect produced by the lancet. To which the answer appears to be, that in such cases digitalis is not to be trusted in: and although we may lower and soften the pulse, we do not at the same time produce corresponding effects upon the part in which the inflammatory action is going on. In other words, the effects of digitalis are perfectly distinct from those brought about by actually diminishing the quantity of circulating blood.

Foxglove has been recommended in active hæmorrhage, but it is dangerous: for if hæmorrhage should recur in a patient under its influence, death would probably follow.

Digitalis, independent of its diuretic powers, is sometimes a useful palliative to the most distressing symptoms of hydrothorax; but the cases in which the most decided benefit has resulted from its use are those of organic affections of the heart or larger blood-vessels. In *angina pectoris*, in some cases of aneurism, in violent and remitting attacks of palpitation, digitalis has proved a valuable and effective sedative. On the necessity of the extremest caution in its use in such cases, and of most assiduously watching the various fluctuations of the patient, I need not again insist; and it must be always remembered, that in some constitutions the alarming symptoms are much more readily induced than in others; and that it is impossible to state, in any case, what precise quantity of the remedy must be administered to produce particular effects.

I shall conclude this subject with a few remarks on the forms and doses of digitalis, which I have elsewhere published (*Manual of Pharmacy*), and with the formulæ of the Pharmacopœia.

The best forms for the administration of digitalis appear to be the powder and the tincture; to these the Pharmacopœia adds an infusion.

Of the powdered leaves one grain may be given, in the form of pills, twice a day, as an incipient dose, and it may be gradually increased by quarter-grains until some decided effect results; recollecting always, however, that its influence may come on suddenly, and that, without any previous notice, the pulse may, after the fourth or fifth dose, rapidly sink, and bring the patient into a state requiring careful management. In the use of the tincture, precaution is equally necessary. As the prescription now stands in the Pharmacopœia, four ounces of the dried leaves are directed to be digested for fourteen days, without heat, in a quart of proof-spirit: it is then to be filtered off for use. Of this tincture, thus prepared, about ten minims twice a day may be called an incipient dose, and it may be gradually and cautiously augmented by two minims daily, till it produces the desired action upon the pulse. It is sometimes customary, in pharmaceutical laboratories, to leave tinctures upon the dregs, after they have stood a due time, and gradually to pour off the clear part for use; the dregs are afterwards pressed out, and the last portion of tincture acquires, by this careless proceeding, double the strength of the first. A person suffering under hydrothorax, who had been in the habit of taking forty drops of tincture of digitalis every night, went from home without his medicine, and was obliged to send to an apothecary in the country for an ounce of the tincture, of which he took the accustomed dose; its effects were much more violent than usual; and he died, exhausted by continual vomiting and faintings, in the morning. Very particular inquiries were made respecting the quality of the tincture: when it appeared that the leaves had been shaken out of the bottle in nearly a dry state, since an ounce of the tincture was with much difficulty squeezed out of them. Here, therefore, the strength of the tincture was not only increased by long standing, but probably greatly augmented by evaporation; and there is little doubt that the patient died of the over-dose, and not of his disease. Similar instances of carelessness in regard to tinctures are not uncommon; and they deserve severe censure, from the uncertainty of effect that must always ensue, and from the dangerous consequences that may, as in the above instance, follow.

There is another precaution, not only applicable to the use of digitalis, but also to that of other analogous and powerful remedies. It is well known that their dose may often be augmented, by slow degrees, to a remarkable extent. A person habituated to opium will perceive no effect from a dose which would, perhaps, prove fatal to one who had never taken it. Doses of digitalis are borne by persons who have long used it, which could not have been given to them with impunity in the first instance. Hence persons often do themselves mischief by resuming their medicine, after some interval, in the same doses they had previously employed it. This observation particularly applies to patients who erroneously suppose that a dose once taken may always with impunity be repeated.

The effects of digitalis, like those of other medicines, are sometimes singularly modified by peculiarities of habit: it has thus been administered in large doses without any corresponding affection of the pulse; sometimes it proves merely diuretic, and sometimes it acts as a brisk purge; but its general operation is that above described.

Digitalis has not been employed as an external application with any success.

The following are the officinal formulæ of digitalis directed in the present Pharmacopœia.

Infusum Digitalis.	Infusion of Foxglove.
℞ Digitalis Foliorum exsiccatorum, drachmam,	Take of Foxglove Leaves dried, a drachm,
Spiritûs Cinnamomi, fluidunciam,	Spirit of Cinnamon, a fluid ounce,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera digitalis folia in aquâ per horas quatuor, in vase levitèr clauso, et cola; tum adjice spiritum.	Macerate the foxglove leaves in the water for four hours, in a lightly-covered vessel, and strain; then add the spirit.

This infusion is only half the strength of that directed in the previous Pharmacopœia; it is not, however, upon the whole, a good form for so powerful a remedy; the powder, or the tincture, are preferable. Of the above, from two drachms to half an ounce, twice a day, may be a dose, gradually increased, with the precautions already enforced, till it produces the desired effect.

Tinctura Digitalis.	Tincture of Foxglove.
℞ Digitalis Foliorum exsiccatorum, uncias quatuor,	Take of Foxglove Leaves dried, four ounces,
Spiritûs tenuioris octarios, duos ;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

The precautions requisite in the preparation and exhibition of this important tincture, together with its dose and effects, have been above detailed. It should not be exhibited with substances likely to combine with or modify its active principle. Tincture of digitalis is not rendered turbid by water, nor by the greater number of the simple infusions; and it may be given without any impropriety in a saline draught, or with camphor or almond mixture; but the free acids should be avoided till the chemical characters of *digitalia* are better known.

The *seeds of digitalis* seem uselessly introduced into the list of the Materia Medica: they are said to be uncertain in their operation.

DILL, *see* Anethum.

DILUENTS (diluo, *I dilute*). Under this term, a number of fluid agents are included, of an inert character, and calculated, by the quantity in which they may be taken, to attenuate the blood and the secretions. The principal and most effective diluent is *water* (*see* Aqua), and it forms the basis of the others. There are many cases in which diluents perform very important remedial functions, as in allaying thirst, promoting perspiration, and increasing the secretion of the kidnies; hence their use in febrile and inflammatory disorders, and in many instances of urinary irritation and gravel. They also act more directly upon the contents, and influence the functions, of the stomach and intestines; hence it is that a moderate quantity of aqueous liquid, taken at meals, promotes digestion, and modifies the action of the bile and the formation of chyle. The *temperature* of diluents is often a matter of much consequence, as in the varied effects of hot, tepid, and iced water. The operation of medicines is also greatly influenced by their state of dilution; a dose of laudanum, for instance, or of hydrocyanic acid, given in a tea-spoonful of water, will be more immediate in its action, than when administered in two or three ounces of the same fluid; and in many other instances, the skilful practitioner will adapt his prescriptions to particular purposes by merely varying the proportion of the *diluent.* Two drachms of sulphate of magnesia in an ounce of water, is often inert as an aperient, when the same quantity of the salt, in half a pint of tepid water, will run off speedily by the bowels; the influence of many mineral waters, as remedial agents, is referable to the quantity in which they are taken, and to the change thus effected in the operation of their active principles upon the system. In the exhibition of emetics, and of *enemata*, the influence of dilution is also most important.

DIOSMA (δις, *double*, and οσμη, *odour*). *Folia.* Buchu leaves. The *leaves* of the *Diosma crenata. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Rutaceæ.

The crenated diosma is a native of the Cape of Good Hope. The leaves are about an inch long, and nearly half an inch in breadth; they are ovato-lanceolate, and crenated upon the margin, smooth and bright-green on the upper, and pale on the under surface, which is studded with glands. The flowers are axillary and solitary, and the leaflets of the calyx are awl-shaped.

Buchu leaves have a peculiar, strong, and somewhat aromatic odour, and a pungent and sweetish flavour, at first somewhat resembling that of peppermint. Their qualities are extracted by infusion in hot water, and by digestion in proof spirit; they afford, according to Cadet de Gassicourt, 0·7 per cent. of essential oil, 21 of gum, 6 of extractive, 1 of chlorophylla, and 2 of resin; the residue is inert fibre. They are diuretic and diaphoretic; they have been found useful in chronic irritation of the bladder, and in rheumatic pains, and generally as a tonic stimulant. The infusion is a good form, the dose being from an ounce and a half to two ounces three or four times a day. The *Dublin Pharmacopœia* directs a *tincture*, in the proportion of two ounces of the leaves to a pint of proof spirit: it is a good adjunct to the infusion.

INFUSUM DIOSMÆ.	INFUSION OF DIOSMA.
℞ Diosmæ, unciam,	Take of Diosma, an ounce,
Aquæ destillate ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas quatuor, in vase levitèr clauso, et cola.	Macerate for four hours in a lightly-covered vessel, and strain.

DIRIGENTS. A term applied in old pharmacy to certain ingredients in prescriptions, which were supposed to *direct* the operations of others in their actions upon particular organs.

DISCUTIENTS. Remedies employed in promoting the resolution of tumours.

DISINFECTANTS. Substances which destroy infectious and contagious poisons. Many articles were formerly considered as possessing these properties, which are now known to be ineffectual, such as the fumes of vinegar, of burned resins, and aromatic woods, and certain essential oils. These, however, only cover bad odours. The real disinfectants are few in number; they comprise two or three of the gaseous acids; but all these have been superseded by the peculiar powers of *chlorine.*

DIURETICS (δια, *through*, and ουρειν, *to make water*). Substances which increase the discharge of urine. Water, and other diluents, have sometimes been classed among these remedies, but the term is more properly applied to medicines which exert some peculiar stimulant power upon the secretory structure of the kidneys, such as acetate and nitrate of potassa, squills, digitalis, the turpentines, &c.

DOG ROSE, *see* Rosa Canina.

DOLICHOS, *see* Mucuna.

DOREMA, *see* Ammoniacum.

DORSTENIA, *see* Contrajerva.

DULCAMARA (dulcis, *sweet*, and amarus, *bitter*). *Caulis.* The *stalk* of the *Bitter-sweet*, or *Woody Nightshade. Solanum dulcamara. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

This plant is common in shady places, and in hedges; it flowers about the end of June, and its berries ripen in October; its stalk is slender, climbing, alternately branched, angular, brittle, and hollow; the leaves long, oval, pointed, veined, and deep green; the flowers are in clusters; the corolla is monopetalous, and divided into five pointed segments, bent back, purple, and marked at the base with two green spots; the tube is short, with a black mouth; the calyx small, and divided into five segments of a purple hue; the filaments are short, black, and inserted in the tube of the corolla; the anthers are yellow, erect, and unite at their points; the style is longer than the stamen, and terminated by a simple obtuse stigma; the germen is oval, and becomes a bilocular berry, which gradually reddens, and contains several flat yellowish seeds. The fresh twigs, gathered in dry situations, in the autumn, have a peculiar bitter-sweet and slightly acrid flavour. Their extractive matter has been called *picroglycion*, or *dulcamarin*. According to Pfaff, 100 parts of the twigs contain—

Bitter-sweet extractive	21·8
Albumen	3·2
Gummy extractive	12·0
Wax	1·4
Resin, containing benzoic acid	2·7
Gummy matter, smelling of vanilla; a little starch, acids, and salts	2·0
Oxalate and phosphate of lime	4·0
Woody fibre	52·9

According to Desfosses (*Journ. de Pharm.*, vi. & vii.), the activity of solanum is referable to an alkaloid, which may be termed *solania;* it appears not to form crystallisable salts. According to Blanchet, its ultimate elements are, 62·0 carbon, 8·9 hydrogen, 1·6 nitrogen, 27·5 oxygen.

According to Otto, one grain of solania killed a rabbit in nine hours, and the symptoms were those of a narcotic poison. (*Journ. de Pharm.*, xx.)

The decoction of dulcamara is said to operate as a narcotic and diuretic. It has chiefly gained celebrity in cutaneous affections, and has been recommended in chronic rheumatism; but it is entitled to no confidence, and should not be retained in the Materia Medica of the Pharmacopœia. The notion of the extremely poisonous nature of its berries seems to be erroneous. Duval found that 180 berries produced no effect upon a dog, and that large doses of the extract might be administered with impunity (*Hist. des Solanum*, 1813). Orfila states that the extract of the *Solanum nigrum* is about as efficient as lettuce opium.

DECOCTUM DULCAMARÆ.	DECOCTION OF DULCAMARA.
℞ Dulcamaræ concisæ, drachmas decem,	Take of Dulcamara, cut, ten drachms,
Aquæ destillatæ, octarium cum semisse;	Distilled Water, a pint and a half;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

"It is possessed of diuretic, diaphoretic, and narcotic properties, and has been found useful in humoral asthma and dropsy, and in *lepra vulgaris*, and *alphas*, and ptyriasis, in conjunction with bichloride of mercury. The dose is from fʒiv. to f℥j., combined with any aromatic tincture, given three times a day." (*Lond. Disp.*)

ELATERIUM (*ελαυνειν, to stimulate*). *Pepones recentes.* The *fresh fruit*, or *gourds*, of the *Momordica Elaterium. Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Cucurbitaceæ.

This species of *Momordica*, known under the title of the *wild*, or *squirting cucumber*, is cultivated for medical use; it is perennial, and a native of the South of Europe; it flowers in June and July; its root is long, thick, and fleshy; its stems are branched, round, thick, trailing, but without tendrils; the leaves are somewhat heart-shaped, slightly sinuated, veined, rough, reticulated, deep green above, and pale underneath, and stand upon strong footstalks, from the base of which the flowers proceed, and are both male and female; the corolla is divided into five acute segments, reticulated with green veins, and placed above the germen; the calyx consists of five narrow acute segments; the stamina in the male flowers are three, short and tapering, two having cloven anthers, and the other a simple one; in the female flowers the filaments are very short, and without anthers; the style is short, trifid, and terminated by oblong green stigmata; the fruit is oblong, hairy, and divided into three cells, containing many flat seeds; it falls from its stalk when fully ripe, and throws out its juice through the remaining aperture.

For the preparation of what is termed the *extract*, the cucumbers should be gathered in September, when in rather an unripe state. "They should be sprinkled with water, each cucumber cut through longitudinally, thrown upon a sieve, and the clear juice allowed to run from it without pressure. The juice soon becomes turbid, and, after standing a few hours, a sediment is formed from which the clear fluid should be decanted. This sediment is *elaterium.* It should be carefully dried, by being spread on fine linen, and exposed to warm dry air in the shade. The juice obtained by the expression of the fruit is inspissated, and forms much of the elaterium of the shops." (*Lond. Disp.*)

When carefully prepared, elaterium is light, friable, and of a pale dingy-green colour. When brown, hard, and of a gummy appearance, it is not to be depended on: this is generally the character of that which is prepared abroad.

According to Dr. Paris, elaterium contains about one-tenth of its weight of a peculiar principle, to which its activity is referable, and which he terms *elatin.* According to Dr. Clutterbuck, forty cucumbers yield only six grains of genuine elaterium, which is contained in the juice surrounding the seeds, and which is violently purgative in doses not exceeding one-eighth of a grain.

Mr. Hennell obtained a crystalline principle from elaterium by boiling it in alcohol, then distilling off the greater part of the alcohol, and leaving the residue to spontaneous evaporation; the residual matter consists of a green resin, in which the activity of the elaterium appears to reside, and a crystalline matter; the purgative resin is separable by ether, the crystallisable principle being left nearly pure; it separates from its hot alcoholic solution in colourless acicular tufts; ether and water scarcely dissolve it; it is fusible, has a bitter taste, and is neither acid nor alkaline. It contains no nitrogen. 100 grains of elaterium afforded 40 of this crystalline substance, and 21 of green resin, the residue being starch, ligneous fibre, and earthy matter.

According to Dr. Morries, the purgative principle of elaterium (*elaterin*) is obtained by evaporating an alcoholic tincture of elaterium to the consistence of thin oil, and pouring it into boiling distilled water; it falls as a crystalline precipitate, which is to be purified by a second alcoholic solution and aqueous precipitation. Elaterin is intensely bitter; insoluble in water and alkalis, sparingly soluble in dilute acids, and readily soluble in alcohol, ether, and oils. It has no alkaline reaction on litmus. The best English elaterium yields 26 per cent., the worst 15 per cent. French elaterium does not contain above 5 or 6 per cent.; hence the irregularity in the cathartic effects of this drug. Elaterin is purgative in the dose of $\frac{1}{10}$th of a grain; $\frac{1}{5}$th of a grain, in two doses, administered at an interval of twenty-four hours, to a rabbit, killed it in seventeen hours after the second dose. (*Edinb. Med. and Surg. Journ.*, xxxv., 339. CHRISTISON, *on Poisons*, chap. xx.)

The following are the directions, in the *London Pharmacopœia*, for the preparation of elaterium:—

EXTRACTUM ELATERII.	EXTRACT OF ELATERIUM.
Elaterii pepones maturos scinde, et succum levissimè expressum per cribrum setaceum tenuissimum cola; deindè per aliquot horas sepone, donec crassior pars subsederit. Rejectâ parte tenuiore supernatante, partem crassiorem leni calore exsicca.	Slice the ripe gourds of elaterium, and strain the juice, very gently expressed, through a very fine hair-sieve; then set it aside for some hours, till the thicker part has subsided. Having rejected the thinner supernatant part, dry the thicker part by a gentle heat.

Ordinary elaterium is seldom active in less than half-grain doses, which may be repeated every three or four hours till they produce the desired effect. It is chiefly used in dropsical affections, and its operation is remarkable for the quantity of watery secretion which it brings away; but it should be administered with much caution, and by no means frequently, for hypercatharsis and unmanageable diarrhœa, attended by great debility, sometimes follow its injudicious exhibition.

As a purge, in obstinate cases of constipation, it is inferior in certainty of operation to the oil of *Croton*, but, as a hydragogue, it will frequently evacuate water where other diuretics and drastic purges fail. The following is, perhaps, the safest mode of prescribing elaterium:—

℞ Extracti Elaterii, gr. ij.
Sacchari Purificati, ʒj.
Optimè terantur simul, dein in pulveres octo æquales dividentur, quarum capiat æger unum omni horæ quadrante, donec adsit catharsis.

Where a very efficient suppository is required, Dr. Paris recommends one or two grains of elaterium, rubbed up with eight grains of hard soap.

In reference to the toxicological history of elaterium, Dr. Christison observes, that the plant itself is probably poisonous, but that the only case in point with which he is acquainted, is a singular instance of poisoning, apparently produced by the plant having been carried for some time betwixt the hat and head. A medical gentleman in Paris, after carrying a specimen to his lodgings in his hat, was seized in half an hour with acute pain and sense of tightness in the head, succeeded by colic pains, fixed pain in the stomach, watery purging, bilious vomiting, and fever. The symptoms continued upwards of twelve hours. (*Annales d'Hygèine Publique*, VIII., 333.)

The hands of the persons who prepare elaterium are often much excoriated, and, without great precaution, the bowels are purged.

ELECTUARIES, *see* CONFECTIONS. According to Dr. Paris (*Pharmacologia*) the term *Electarium* is first used by Cælius Aurelianus; but the *εκλικτον* of Hippocrates was an electuary. Electuaries generally consist of powders mixed with syrup or treacle, or occasionally with mucilage, or even water. Some of the inert *confections* of the Pharmacopœia are good vehicles for active and heavy powders, and for the formation of electuaries.

ELEMI. The *resin* of the *Amyris elemifera*. *Cl.* 8. *Ord.* 1. Octandria Monogynia. *Nat. Ord.* Amyridiæ.

This tree is a native of Carolina and the Brazils; it is low, and covered with a gray bark; the leaves are opposite, on footstalks, ternate, and sometimes pinnate, with stiff pointed leaflets of a bright green colour, shining, and downy underneath. The flowers are in terminal corymbs, small, white, with the petals inflex at the tips. The fruit is the size and figure of an olive. (*Lond. Disp.*)

Elemi is obtained from incisions in the bark; it exudes and dries in the sun; it is imported either in mats and chests, or in cakes wrapped in flag-leaves. It is a yellow translucent substance, of a peculiar aromatic odour, and slightly bitter taste; it is somewhat tenacious, and easily fusible; its specific gravity is 1·019. When distilled with water, a fragrant essential oil passes over, and a brittle inodorous resin remains. It is almost entirely soluble in boiling alcohol. According to Bonastre, 100 parts of American elemi contain—

Volatile oil	12·5
Resin, soluble in cold alcohol . .	60·0
Resin, insoluble in cold, but soluble in boiling alcohol	24·0
Bitter extractive	2·0
Impurities	1·5

The *Unguentum Elemi* of the Pharmacopœia is an old, but useful ointment, formerly known under the name of *yellow basilicon;* it is slightly stimulant, and has some viscidity and adhesiveness. It is frequently used for setons and issues, and applied to old indolent sores.

UNGUENTUM ELEMI.	OINTMENT OF ELEMI.
℞ Elemi, libram,	Take of Elemi, a pound,
Terebinthinæ vulgaris, uncias decem,	Common Turpentine, ten ounces,
Sevi, libras duas,	Suet, two pounds,
Olivæ Olei, fluiduncias duas;	Olive Oil, two fluidounces;
Elemi cum sevo simul liquefac; tum ab igne remove, et his terebinthinam et oleum statim misce; deindè per linteum exprime.	Melt the elemi with the suet; then remove them from the fire, and immediately mix with them the turpentine and the oil; then press them through a linen cloth.

EMETICS (εμεω, *I vomit*). Substances which occasion vomiting. Much has been written upon the *cause* of that apparent inversion of the action of the stomach which occasions vomiting, some referring it to spasm of the abdominal and other muscles, and regarding the stomach as passive; others considering the muscles and nerves of the stomach itself as immediately influencing the phenomena. Upon these questions the reader may consult Magendie, Marshall Hall, Dr. Harrison, and other theoretical writers.

The practical uses of emetics are various and important. Soon after their introduction into the stomach, *nausea* comes on; the patient becomes chilly, his countenance pinched and pale, his pulse feeble, and often quick or irregular, the usual force of the circulation being considerably diminished. In this state, the activity of the absorbents is increased, but the muscular powers relaxed. Hence, in some cases of hæmorrhage, in the treatment of anasarca, and some other forms of dropsy, in certain cases of spasm, and in the passage of a gall-stone through the bile-ducts, *nauseation* may be usefully induced, whereas vomiting might be highly prejudicial. In such cases, therefore, the dose of the emetic must be modified so as to produce the desired effect, and such emetics selected as are the most efficient in exciting nausea. In the act of *vomiting*, on the other hand, the face becomes flushed, perspiration ensues, the pulse acquires strength and rapidity, and the general powers of the absorbent system are diminished. Afterwards, a degree of languor, and often drowsiness, succeeds, and the pulse gradually returns to its natural standard.

This statement will sufficiently show the necessity of selecting particular emetics for particular purposes: where nauseation, where diaphoresis, or where a sudden and quick evacuation of the contents of the stomach, are required. *Ipecacuanha* is almost the only vegetable emetic which is relied on; emetic tartar, and the sulphates of copper and zinc, are also valuable medicines of the class. Emetics are often administered with great advantage at the commencement of certain acute and febrile diseases, as creating a kind of counteraction in the system, by which the symptoms are mitigated, or in some instances wholly superseded. They are employed to evacuate the stomach when overloaded with food, and for the removal of poisons, and for the fulfilment of a variety of secondary ends, which are mentioned under individual articles.

EMETIN, *see* IPECACUANHA.

EMMENAGOGUES (*εμμενια, the menses*, and *αγειν, to induce*). Remedies which induce the catamenial discharge.

EMOLLIENTS (emollio, *I soften*). Substances which soften and relax the parts to which they are applied; or, according to the definition of Cullen, "substances whose application diminishes the force of cohesion in the particles of the solid matter of the human body, and thereby renders them more lax and flexible."

EMPLASTRA (*εμπλασσειν, to spread upon*). Plasters.

The term *plaster* is applied to adhesive compounds limited to external use, and generally spread, by the aid of heat, upon leather, linen, calico, or silk; in this operation care should be taken that the compositions are injured as little as possible by heat.

Plasters are frequently used as mere mechanical supports, and in this way they often effect essential service: indeed, one of the great improvements in modern surgery consists in healing ulcers by strips of adhesive plaster, so applied as to support the parts, and bring the edges of the sore together.

Sometimes plasters are beneficial from the warmth which they afford as a mere covering to the part; they are also occasionally used as stimulants, rubefacients, and vesicants; and sometimes sedatives are thus applied to allay pain and irritation.

The following are the Plasters directed in the present *London Pharmacopœia.*

Emplastrum Ammoniaci	Plaster of Ammoniacum, *see* Ammoniacum.
Emplastrum Ammoniaci cum Hydrargyro	Plaster of Ammoniacum with Mercury, *see* Hydrargyrum.
Emplastrum Belladonnæ	Plaster of Belladonna, *see* Belladonna.
Emplastrum Cantharidis	Plaster of Cantharides, *see* Cantharides.
Emplastrum Ceræ	Plaster of Wax, *see* Cera.
Emplastrum Galbani	Plaster of Galbanum, *see* Galbanum.
Emplastrum Hydrargyri	Plaster of Mercury, *see* Hydrargyrum.
Emplastrum Opii	Plaster of Opium, *see* Opium.
Emplastrum Picis	Plaster of Pitch, *see* Pix.
Emplastrum Plumbi	Plaster of Lead, *see* Plumbum.
Emplastrum Resinæ	Plaster of Resin, *see* Resina.
Emplastrum Saponis	Plaster of Soap, *see* Sapo.

ENEMA (*ενιημειν, to inject*). *A Clyster* (from *κλυζειν, to wash out*). The injection of medicines into the rectum furnishes the practitioner with many valuable resources, though, as Dr. Paris observes, "the remedy has not escaped its due share of persecution; Paracelsus bestowed upon it the epithet *turpissimum medicamentum*, and Van Helmont that of *pudendum medicorum subsidium.*"

The following remarks on clysters are abridged from Dr. Paris, *On the Theory and Art of Prescribing.* They are calculated, he remarks, to fulfil the following indications; namely, 1. To promote the tardy operation of a cathartic, or to evacuate the bowels, where from delicacy of stomach medicines cannot be retained, or from debility of body they cannot be safely administered. Warm water and aperients attain these ends. 2. To induce relaxation, as by a tobacco clyster. 3. To produce astringent, anodyne, or carminative, effects, as a starch clyster, with opium, assafœtida, oil of turpentine, &c. In some cases, cold water acts as an astringent, and from its impression on the rectum affords relief in piles. 4. To destroy ascarides. 5. To act as an emollient fomentation. 6. To convey nutriment.

In the first case, the quantity of liquid, and the force with which it is injected, affect their operation: "When most forcibly urged, they rarely reach beyond the sigmoid flexure of the colon, and yet when the largest quantity of fluid which the bowels will admit is introduced with considerable impulse, the local impression is so powerful that it is at once extended, by the medium of sympathy, through the whole of the alimentary canal, and very thorough and copious discharges result." When clysters are administered for the fulfilment of any of the last five indications, the quantity of the injection requires to be graduated; thus, to prevent an opiate clyster from being returned it should seldom consist of more than three or four ounces of liquid, and the same precaution is required in employing a bitter decoction for the removal of worms. "The proportions of fluid which are necessary for the different stages of life, under ordinary circumstances, may be stated as follows: an infant at its birth, or soon after, requires about *one fluid ounce;* a child between the ages of one and five years, from *three to four fluid ounces;* a youth of ten or fifteen, from *six to eight fluid ounces;* and an adult may require *twelve.* With regard to the dose of the active ingredient of a *lavement*, it may be estimated as triple of that taken by the mouth."

The following *Enemata* are directed in the Pharmacopœia:—

Enema Aloes	Enema of Aloes, *see* ALOES.
Enema Colocynthidis	Enema of Colocynth, *see* COLOCYNTHIS.
Enema Opii	Enema of Opium, *see* OPIUM.
Enema Tabaci	Enema of Tobacco, *see* TABACUM.
Enema Terebinthinæ	Enema of Turpentine, *see* TEREBINTHINÆ OLEUM.

EPISPASTICS (*επι*, *upon*, and *σπαω*, *I draw*). Blistering and other similar applications which produce cuticular discharge by exciting inflammation.

ERGOTA. Ergot. *Spermœdia clavus. Nat. Ord.* Fungaceæ. Spurred Rye. This is a curved, purplish-black body of a cylindrical form, rounded at its extremities, of a firm horny texture, covered with a powdery substance externally, the nature of which is not ascertained. The mass appears to the eye, even when assisted by moderately high magnifying powers, to be a homogeneous substance in which no organization can be detected. But if sliced very thin, and examined in water, by a very powerful microscope, the mass is found to consist of fine flocci, or threads, branched, and bearing spherical sporules as transparent as the flocci themselves; the whole consolidated into a compact substance. In the last edition of the *London Pharmacopœia*, ergot is referred to the *Acinula clavus* of Fries, (*Syst. Mycol.*); but Fries has no such plant in any of his works, and the only species of acinula known, *Acinula caudicans*, is found on the rotten leaves of the common alder, and among melting snow; its organization is quite of another kind from that of spermœdia, and Fries, who regards the other as a morbid state of the grain of certain grasses, considers acinula as a true fungus. (*Lindley.*)

Ergot yields a deep brown tincture with alcohol, which on evaporation leaves a considerable proportion of wax; it also yields a bitter and sourish extractive, and crystals which have been supposed to contain morphia. Water takes up a brown bitter substance from the ergot after digestion in alcohol. Wiggins obtained from ergot an odorous fixed oil, fungin, albumen, osmazome, wax, and a peculiar extractive substance in which its active properties apparently reside. It is said sometimes to be adulterated with plaster of Paris casts, coloured to resemble it.

Spurred rye appears to act as a poison on all animals. In man, in a dose of two drachms, it excites giddiness, headach, flushed face, pain and spasm in the stomach, nausea, vomiting, cholic, purging, and weariness in the limbs. But its effects are not commonly observed in this way, and have usually been produced by grain contaminated by the spur having been employed for bread. In these cases two sets of symptoms have been described: the one characterized by violent spasmodic convulsions; the other, by a depraved state of constitution, ending in a remarkable form of gangrene.

The symptoms of *convulsive ergotism* are described as follows, by Dr. Wagner of Schlieben. (*Journal der praktischen Heilkunde*, LXXIII. and LXXIV., as quoted by Dr. Christison, *On Poisons*, chap. XL.) In consequence of unusual moisture and late frosts in the summer of 1831, the rye was so much spurred in many fields, that a fifth, at least, of the prickles were diseased. As soon as the country people began to use the new rye, convulsive ergotism showed itself, and it recurred, more or less, till next midsummer, when the diseased grain was all consumed. The usual symptoms were, at first, periodical weariness; afterwards, an uneasy sense of contraction in the hands and feet, and at length violent and permanent contraction of the flexor muscles of the arms, legs, feet, hands, fingers, and toes, with frequent attacks of a sense of burning or creeping on the skin. These were the essential symptoms; but a great variety of accessory nervous affections occasionally presented themselves. There was seldom any disturbance of the mind, except in some of the fatal cases, where epileptic convulsions and coma preceded death. Every case was cured by emetics, laxatives, and frequent small doses of opium, provided it was taken in reasonable time, and the unwholesome food was completely withdrawn.

The symptoms of *gangrenous ergotism* have been described by various authors: they are summed up as follows, by Dr. Christison, in the chapter of his work relating to poisonous grain. In Germany, this disease is known by the name of *Kriechelkrantheit*, or *creeping sickness.* "In the most severe form, it appeared in Switzerland, in 1709 and 1716; it commenced, according to Lang, a physician of Lucerne, with general weakness, weariness, and a feeling as of insects creeping over the skin; when these symptoms had lasted some days or weeks, the extremities became cold, white, stiff, benumbed, and at length so insensible, that deep incisions were not felt; then excruciating pains of the limbs supervened, along with fever, headache, and sometimes bleeding from the nose; finally, the affected parts, and, in the first instance, the fingers and arms, afterwards the toes and legs, shrivelled, dried up, and dropped off at the joints: a healthy granulation succeeded, but the powers of life were frequently exhausted before that stage was reached. The appetite, as in the convulsive form of the disease, remained voracious throughout. In milder cases, as it prevailed at different times in France, nausea and vomiting attended the precursory symptoms, and the gangrenous affection was accompanied by dark vesications. In another variety, which has been witnessed in various parts of Germany, the chief symptoms were spasmodic contractions of the limbs at first, and afterwards weakness of mind, voracity, and dyspepsia, which, if not followed by recovery, as generally happened, either terminated in fatuity, or in fatal gangrene."

Instances of epidemics, resulting from spurred rye, and other diseased grain, have of late years become rare, in consequence of agricultural improvement; the creeping sickness has, however, been observed several times in Germany, within the present century.

The extraordinary medicinal powers of spurred rye in its action upon the gravid uterus, are stated, upon the authority of Robert, (*Erlaüterungen und Beiträge zur Geschichte des Mutterkorns:* Rusts *Magazin für die* *gesammte Heilkunde,*) to have been long known in Germany; they were, however, first brought into general notice between the years 1807 and 1814, by the physicians of the United States. Its peculiar property appears to be, that of increasing the contractile powers of the gravid uterus, when too languid to effect the expulsion of its contents; hence the use of ergot in cases of tardy labour, and for the purpose of promoting the separation of the placenta, and quickening the contraction of the uterus after delivery.

It might be supposed, that a remedy possessing such powers, would also be emmenagogue, and that it would furnish a dangerous means of producing abortion; this, however, appears not to be the case, and, as far as present experience goes, ergot has the singular property of accelerating natural labour only, and not of inducing it, at least in the early stages of pregnancy. As an emmenagogue, it seems to be inactive, and to exert no power whatever over the unimpregnated uterus.

Dr. Ives, in the American edition of Paris's *Pharmacologia*, has given the following indications for the use of ergot:

1. When, in lingering labours, the child has descended into the pelvis, the parts dilated and relaxed, the pains having ceased, or being too ineffectual to advance the labour, and there is danger to be apprehended from delay, by exhaustion of strength and vital energy, from hæmorrhage, or other alarming symptoms. 2. When the pains are transferred from the uterus to other parts of the body, or to the whole muscular system, producing convulsions. After bleeding, the ergot concentrates those misplaced pains upon the uterus, which it restores to its appropriate action, and the convulsions cease. 3. In early stages of pregnancy when abortion becomes inevitable, accompanied with profuse hæmorrhage, and feeble uterine contractions. 4. When the placenta is retained, from a deficiency of contraction. 5. In patients liable to hæmorrhage immediately after delivery. In such cases, the ergot may be given as a preventive, a few minutes before the termination of the labour. 6. When hæmorrhage or lochial discharges are too profuse immediately after delivery, and the uterus continues dilated and relaxed without any ability to contract.

The usual forms for the exhibition of ergot, are powder, infusion, or tincture. Ten grains of the powder are given every fifteen minutes, till it produces the desired effects. Or one drachm of bruised ergot may be infused for an hour in four ounces of boiling water.

ERRHINES (εν, *in*, and ῥιν, *the nose*). Substances which stimulate the nasal membrane, exciting sneezing, and an increased secretion of mucus. They are also termed *Sternutatories.*

The errhine in most common use, is *snuff*, a compound of various substances, of which tobacco is generally supposed to be the basis, and to which various additions are made for various purposes, but chiefly for increasing its irritating quality; these additions are either mechanical or chemical in their effect; if the former, fine sand and powdered glass are said to be the most common; if the latter, carbonate of ammonia, essential oils, hellebore, euphorbium, and some other vegetable irritants:

asarabacca leaves had a place in former Pharmacopœiæ, on account of their stimulating merits, and the *Pulvis Sternutatorius*, or *Pulvis Asari compositus*, commonly called *Herb Snuff*, was constituted as follows:

Take of the Leaves of Asarabacca, three parts,
Leaves of Marjoram,
Flowers of Lavender, of each one part;
Rub them together into a powder.

When the nasty custom of taking snuff is once established, it is, like other evil habits, difficultly broken. By habitual use, snuff, like other stimulants, gradually loses its effects, and hence the necessity under which the snuff-taker finds himself, of increasing the frequency and quantities of his pinches, till he becomes an annoyance, if not to himself, at all events, to others. It has sometimes been stated that the habit of snuffing, when once established, cannot be left off with impunity; no doubt, when the discharge which it excites is considerable, as at first it often is, its sudden suppression might possibly be productive of some evil; but by habitual use, the errhine and stimulatory powers of snuff are soon lost, and no serious mischief need be apprehended, therefore, on that score.

As remedial agents, errhines are sometimes useful in headache, toothache, earache, deafness, chronic ophthalmia, and habitual drowsiness; they are often also mischievous, producing a morbid state of the nasal membrane, and sometimes inducing a tendency to dangerous bleeding from the nose. Cullen supposed that snuff might, in some cases, by its local stimulant action, prevent palsy or apoplexy; but Morgagni cites a case in which a fatal attack of apoplexy was induced by sneezing, and Vanswieten has shown that frequent sneezing loads the vessels of the head by obstructing the return of venous blood from the brain; hence the stuffy articulation, and suffused eyes of many professed snuff-takers.

ESCHAROTICS (*εσχαροειν, to scab over*). Substances which produce an eschar upon the skin, as the consequence of their caustic or destructive action.

ESSENTIAL OILS, *see* OLEA DESTILLATA.

ETHER, *see* ÆTHER.

EUPHORBIUM. *Gummi-Resina.* The *gum-resin* of *Euphorbia officinarum. Cl.* 11. *Ord.* 3. Dodecandria Trigynia. *Nat. Ord.* Euphorbiaceæ (named after Euphorbus, physician to Juba, King of Libya).

This plant is a native of Africa: it is a succulent shrubby perennial. "When arrived at maturity, it has a simple, erect, round stem, about five feet high; furrowed with eighteen or more longitudinal fissures.

From the summit, branches are thrown out in every direction, going off, first horizontally, and then ascending so as to give to the whole plant the appearance of the skeleton of a large goblet supported on a foot. The branches are about an inch in diameter, more distinctly angled than the stem, scolloped, and furnished with prickles everywhere double. It has no leaves, but instead of them, tubercles adjoining to each pair of prickles. The flowers are sessile, on the extremities of the branches; of a crimson colour. The calyx is of one piece, persistent, with a four or five-toothed lip. The petals are four, turbinated, gibbous, thick, truncated, unequal in situation, and fixed by claws to the margin of the calyx. The filaments are more than twelve, threadlike, longer than the corolla, coming forth at different times, and carrying each two globular anthers: the germen is trigonous, with a simple short style, crowned with three semibifid obtuse stigmas. The capsule is tricoccous, pedicollated, elastic; with round solitary seeds." (*Lond. Disp.* Art. EUPHORBIA.)

All the species of euphorbia afford an acrid, milky juice. The *gum-resin*, as it is not quite properly called, is imported in the form of small hollow tears of an intensely acrid flavour. It is emetic and cathartic, but has long been rejected as an internal remedy: and externally, as an errhine, it is apt to occasion excessive irritation and swelling, so that, although it has sometimes been diluted with inert powders, and snuffed up the nostrils in cases of deafness, amaurosis, &c., it is now no longer employed even in this way. Nor is at present used in stimulating plasters, though the following formula has been extolled by Cheselden and others, for the relief of diseases of the hip-joint, and for exciting superficial inflammation in cases of chronic visceral inflammation.

℞ Emplastri Picis, ℥iv.
Euphorbii, ʒss.
Terebinthinæ vulgaris, q. s.

The peculiar acrid resinous principle contained in this drug has been by some designated *Euphorbin.* Brandes obtained, from 100 parts of euphorbium,

Acrid resin	43·77
Cerin	13·70
Myricin	1·23
Caoutchouc	4·84
Phyteumacolla	0·20
Malate of lime and traces of sulphate	18·82
Malic acid, with malate of potassa and traces of benzoate of potassa	4·90
Sulphate of potassa and of lime	0·55
Phosphate of lime	0·15
Water	5·40
Woody fibre and impurities	5·50
Loss	0·94
	100

EVACUANTS (evacuo, *I empty*). Substances which stimulate particular organs, occasioning increased secretion, or evacuation. The term is generally applied to aperient or purgative remedies.

EXPECTORANTS (ex pectore, *from the breast.*) Remedies which are supposed to facilitate the excretion of mucus from the bronchiæ and trachea.

EXTRACTA. *Extracts.* The term *extract* is applied in pharmacy, to preparations obtained by evaporating certain vegetable juices, infusions, or decoctions, and may contain, independent of *extractive matter*, gum, starch, sugar, albumen or gluten, tan, resin, and other substances, among which we may enumerate certain salifiable bases, such as cinchonia, quinia, morphia, &c. In some cases alcohol is employed, and the extracts are then termed *alcoholic* or *resinous.*

In the preparation of aqueous extracts, a decoction made in the usual way is evaporated, at a temperature not injurious to the substances present. Sometimes the evaporation is conducted directly over the fire, by which the extract is invariably injured; sometimes the process is performed in vessels heated by steam, which is the best method of preparing extracts upon a large scale: in some few instances evaporation at low temperatures, in vessels more or less exhausted of atmospheric air, and consequently under greatly diminished pressure, is resorted to; but the apparatus required for this purpose is complicated, and the benefit derived from it, in respect to the efficacy of the products, not such as to warrant its general adoption. Mr. Barry's contrivance for the purpose is one of the best. (*Medico-Chirur. Trans.* I. 231.) The *water-bath*, directed by the Pharmacopœia, is objectionable in consequence of the length of time required for the evaporation, and the continuous exposure of the extract to air.

When alcohol is employed in the preparation of extracts, the evaporation is usually conducted in a still, which should be heated by steam, and the spirit thus drawn off; the process may be finished in the usual way.

In these evaporations iron, copper, tinned copper, or pewter vessels, are generally used, and sometimes basins of earthenware must be employed; and it would have been well if the Pharmacopœia had directed the greater number of the extracts to be so evaporated as to become brittle when cold; for when originally of the consistency "fit for making pills," they become, on keeping, too hard for that purpose, and not hard enough to be reduced to powder; in this case they are frequently heated, or softened in a hot mortar, before they can be used, and if to be mixed with other substances, it is almost impossible to effect their incorporation. It may also be remarked, that when of such consistency as easily to admit of being formed into pills, these invariably flatten, and often adhere and agglutinate in a warm room, or in summer weather. The sprinkling of extracts with spirit is useless; when properly dried, they do not become mouldy, if kept in a dry place, but the greater number of them do so if they are put into warm pots, and tied over, before they have cooled.

Extracts are in many instances convenient and efficient formulæ, and where it is desirable to prolong the action of a medicine upon the stomach, they may be given in the form of a pill; or, they may be dissolved in common or in aromatic distilled water, and in that way used as substitutes for decoctions, and, in some instances, for the fresh juices of plants.

Extracta.	Extracts.
In Extractis præparandis, nisi alitèr indicatum sit, humorem, balneo aquoso, in patinâ quamprimùm consume, sub finem assiduè spathâ movens, donec crassitudo sit ad pilulas fingendas idonea.	In preparing Extracts, unless otherwise indicated, evaporate the moisture by a water-bath in a pan, as quickly as possible, towards the end stirring constantly with a spatula, until a proper consistence is acquired for forming pills.
Extractis omnibus mollioribus paululum spiritûs rectificati insperge, ne mucida fiant.	Sprinkle a little rectified spirit upon all the softer extracts, lest they become mouldy.

The following are the Extracts directed in the present Pharmacopœia:—

Extractum Aconiti . . .	Extract of Aconite, *see* Aconitum.
Extractum Aloes purificatum .	Extract of Aloes, *see* Aloes.
Extractum Belladonnæ . .	Extract of Belladonna, *see* Belladonna.
Extractum Cinchonæ cordifoliæ .	Extract of heartleaved Cinchona, *see* Cinchona.
Extractum Cinchonæ lancifoliæ .	Extract of lanceleaved Cinchona, *see* Cinchona.
Extractum Cinchonæ oblongifoliæ	Extract of oblongleaved Cinchona, *see* Cinchona.
Extractum Colchici aceticum .	Extract of Colchicum (acetic), *see* Colchicum.
Extractum Colchici cormi . .	Extract of Colchicum (cormus), *see* Colchicum.
Extractum Colocynthidis . .	Extract of Colocynth, *see* Colocynthis.
Extractum Colocynthidis compositum	Extract of Colocynth (compound), *see* Colocynthis.
Extractum Conii . . .	Extract of Hemlock, *see* Conium.
Extractum Digitalis . . .	Extract of Foxglove, *see* Digitalis.
Extractum Elaterii . . .	Extract of Elaterium, *see* Elaterium.
Extractum Gentianæ . .	Extract of Gentian, *see* Gentiana.
Extractum Glycyrrhizæ . .	Extract of Liquorice, *see* Glycyrrhiza.
Extractum Hæmatoxyli . .	Extract of Logwood, *see* Hæmatoxylum.
Extractum Hyoscyami . .	Extract of Henbane, *see* Hyoscyamus.
Extractum Jalapæ . . .	Extract of Jalap, *see* Jalapa.
Extractum Lactucæ . .	Extract of Lettuce, *see* Lactuca.
Extractum Lupuli . . .	Extract of Hops, *see* Lupulus.
Extractum Opii purificatum .	Extract of Opium, *see* Opium.
Extractum Papaveris . .	Extract of Poppy, *see* Papaver.
Extractum Pareiræ . . .	Extract of Pareira, *see* Pareira.
Extractum Rhæi . . .	Extract of Rhubarb, *see* Rhæum.
Extractum Sarsæ . . .	Extract of Sarsaparilla, *see* Sarsa.
Extractum Stramonii. . .	Extract of Thornapple, *see* Stramonium.
Extractum Taraxaci . . .	Extract of Dandelion, *see* Taraxacum.
Extractum Uvæ Ursi. . .	Extract of Whortleberry, *see* Uva Ursi.

FARINA (from *far*, corn). *Flour.* The flour of the seeds of winter wheat, *Triticum hybernum. Cl.* 3. *Ord.* 2. Triandria Monogynia. *Nat. Ord.* Graminaceæ.

Wheat was first cultivated in Sicily, but the country whence it originally came is not known. The spikes of wheat are long, and the grain is lodged in four rows, and imbricate; the chaff is smooth, bellied, and terminated by very short awns, by which it is distinguished from *spring-wheat* (Triticum æstivum), the awns of which are three inches long.

Wheat has two sets of roots; one proceeding directly from the seed, and the other from the *corona* of the plant, about two inches above the first. Several species of wheat are cultivated in this country, but that which is termed *white Dantzic* is said to yield the most productive flour for the manufacture of bread; its grain is small and translucent. (*Lond. Disp.*)

The principal constituents of wheat flour are *starch* (*see* Amylum), *gluten*, and *albumen*: the latter principles may be obtained by tying up the flour in a piece of coarse canvass, and kneading it under a stream of water; the starch is gradually washed out, and a gray, viscid, and elastic substance remains behind, consisting of the gluten and albumen, with a little residuary starch and water. By boiling this substance in alcohol, it is separated into a soluble part, which is *gluten*, and an insoluble matter, which is *albumen.* The mixture of the two constitutes what is sometimes called the *vegeto-animal* principle, from its resemblance in properties and composition to animal matter; in a moist state, it soon passes, under favourable circumstances, into putrefactive fermentation; it exhales ammonia when subjected to destructive distillation, and its ultimate elements are carbon, hydrogen, oxygen, and nitrogen. The tenacity of wheaten dough, and its peculiar fitness for the manufacture of a light, or porous, and nutritious, and digestible bread, depends upon the large relative quantity of this albumino-glutinous part, which is more abundant in the wheat of warm than of cold climates, whence the excellence of the grain grown in the South of Europe, for the purpose of *macaroni*, *vermicelli*, and other similar pastes. The average quantity of nutritive matter in wheat amounts to 955 in 1000, of which 765 is starch, and 190 gluten and albumen.

FERMENTATION. The process by which sugar is converted into alcohol, and which is concerned in the production of beer, wine, and other fermented liquors. *Beer* is usually made in this country of an infusion of ground malt, or *wort*, which is boiled with hops, and afterwards allowed to ferment; the saccharine principle of the malt becomes to a greater or less extent destroyed, or, in other words, converted into alcohol; carbonic acid is evolved, and the hops, by their aroma and bitterness, give the beer an agreeable flavour, and cover the mawkish sweetness of the undecomposed saccharine matter. Strong beer, thus made, is usually called *ale;* and when largely diluted with water, it becomes *small-beer*, which ought to be, therefore, a weak ale. *Porter* derives its character from high-dried malt, which gives it a peculiar flavour, and greatly deepens its colour.

The ale and porter produced in the great breweries of London are excellent in quality, and by no means unimportant as remedial agents; but when they have passed through the hands of the publicans (who are invariably sinners), they are always more or less adulterated and diluted, as the reports of excise prosecutions amply prove: hence the headache, drowsiness, stupor, bowel complaints, and other mischiefs arising from the trash of the retailer, and the necessity, where beer is employed, as it often might be, as a restorative and tonic, of obtaining it from the fountain head, and not from the polluted taps of the public-houses. Small beer is much more difficult to obtain of tolerable quality, and as, on the one hand, porter, and even ale, can scarcely be had in perfection except from the wholesale source, small beer that is worth drinking can seldom be obtained from a brewer of that article, as far, at least, as my experience goes; it is generally too well deserving of its appellation, and though sometimes tolerably palatable when fresh, it speedily becomes flat and sour, or something worse, especially in warm weather; *home-brewed beer*, therefore, is the only beverage of this denomination to which the medical man can resort. The ill character which beer has so generally acquired is referable to its adulterations and imperfections; when in perfection, it is agreeable, wholesome, and nutritious; tonic, slightly exhilarating, and afterwards mildly sedative, and calculated to fulfil many important indications in its medicinal uses. In *bottled beer*, the excess of carbonic acid modifies and generally exalts these qualities.

The composition of alcohol has been above stated (page 25). Its formation during the phenomena of fermentation will be intelligible by reference to the composition of *sugar*, which is its source, and of *carbonic acid*, the substance which sugar throws off during its conversion into alcohol. Adopting Gay-Lussac's views upon this subject, we may regard sugar as a compound of—

	Atoms.	Equivalents.
Carbon	3	18
Hydrogen	3	3
Oxygen	3	24
Sugar	1	45

Now as 22 parts of carbonic acid consist of 6 of carbon and 16 of oxygen (see page 153), and as 23 parts of alcohol consist of 12 of carbon, 3 of hydrogen, and 8 of oxygen (see page 25), it is obvious that the elements of 45 parts of sugar are exactly such as to be capable of conversion into 22 parts of carbonic acid, and 23 of alcohol. The average quantity of alcohol in the strongest ale seldom exceeds 6 per cent., and in porter, 5 per cent.; from strong *Burton ale*, I have, however, obtained between 8 and 9 per cent., and from *brown stout* between 6 and 7 per cent., by measure, of alcohol of 825 sp. gr.

The further changes suffered by wine, beer, and analogous liquids, when exposed at a due temperature to the air, and which are resorted to for the production of vinegar (*see* ACETIC ACID, and ACETUM), are usually described under the term *acetous fermentation*. (See *Manual of Chemistry*, chap. VII. §. 25.)

FERN ROOT, *see* Aspidium.

FERRUM. *Iron.* Iron is a metal which was known in the early ages of the world. Its specific gravity is 7·7; it requires an intense white heat for its fusion; it is very ductile and tenacious, but not very malleable; it is attracted by the magnet, and susceptible, therefore, of induced temporary magnetism, but when pure, it does not permanently retain magnetism. At a high temperature, it undergoes a splendid combustion in oxygen gas. All known specimens of *native iron* are probably of meteoric origin; its principal ores, as far as the commercial supplies of the metal are concerned, are the *oxides* and *carbonates.*

Iron is susceptible of two degrees of oxydizement; each of the oxides is used in medicine, and each forms the basis of a distinct class of salts.

Protoxide of Iron is formed during the solution of iron in dilute sulphuric acid; hydrogen gas is evolved, and the equivalent of oxygen transferred to the metal, which is thus rendered soluble in, and combines with the acid; on adding potassa, and carefully washing and drying the precipitate, out of the contact of air, it acquires a black colour, and is a *protoxide*, not, however, perfectly pure, for in drying, a little oxygen is apt to be absorbed, and a small portion of peroxide formed. When iron filings are moistened with a small quantity of water, or when steam is passed over red-hot iron, a similar oxide is obtained; it is, however, extremely difficult, in consequence of its high affinity for oxygen, to procure it perfectly free from peroxide, but its composition may be accurately determined from the quantity of hydrogen evolved during the action of dilute sulphuric acid upon a given weight of pure iron. The equivalent of iron, thus deduced, is 28, and the protoxide consists of—

	Atoms.	Equivalents.	Per Cent.
Iron	1	28	77·8
Oxygen	1	8	22·2
Protoxide of Iron	1	36	100·0

Peroxide of Iron. Sesquioxide of Iron. This oxide is thrown down, in the form of a brown precipitate, by the addition of potassa to a solution of iron in nitromuriatic acid; it falls in the form of a pale-brown bulky hydrate, which acquires a deeper colour when dried. The same oxide, obtained by exposing sulphate of iron to a red heat, has long been known under the name of *colcothar.* It is constituted of—

	Atoms.	Equivalents.	Per Cent.
Iron	1	28	70
Oxygen	$1\frac{1}{2}$	12	30
Sesquioxide of Iron	1	40	100

There are two *chlorides of iron* corresponding in composition with the oxides, and a *protiodide* and *protobromide;* there are also several *sulphurets;* but the properties and composition of such of its other preparations as are used in medicine, will be evident from the observations on the formulæ of the Pharmacopœia.

Iron is a powerful tonic, but its reputed activity in the metallic state is doubtful; in powder it has been administered with aromatics, and as an electuary, but its uncertain operation under such forms has led to its rejection from modern practice, and to the substitution of its oxides or salts, if we except a few instances in which iron filings are occasionally given as a vermifuge, and in which, from their power of decomposing the salts of copper, and precipitating that metal, they have been administered as an antidote in cases of cupreous poisoning.

Where the effective preparations of iron are not contra-indicated, and where they agree, they augment the appetite, take off muscular flabbiness, remove the pallor of debility, and even give a florid vigour to the countenance, an effect which has sometimes been erroneously attributed to their deepening the colour of the blood. The cases, therefore, which are best adapted for their exhibition, are those of weak and languid habits, where the constitution is what is usually called *broken*, either by long-continued mental anxiety, excessive study, or bodily exertion beyond the strength, and generally, after diseases which have necessarily received a debilitating treatment, or which have left the body in a pallid, and, as it were, flaccid state, very susceptible of fatigue, and of morbid actions in general. But where the preparations of iron are used after active inflammatory diseases, they favour returns of inflammatory action, and are apt to induce chronic mischief: when, therefore, the habit, under such circumstances, shows any symptoms of returning fulness of vessels, where a white tongue is associated with headache, and where the pulse hardens, chalybeates are contra-indicated.

In some painful and obstinate nervous affections, the preparations of iron in large doses have been found of service; and in tic doloureux, Mr. Hutchinson recommends the sesquioxide in doses of half a drachm to a drachm, twice or three times a day. In certain stages of asthma, the same preparation appears, according to Dr. Bree, to lengthen the intermissions of the disease, by enabling the constitution to throw off the causes of the morbid irritation in the stomach and in the lungs. In this view, he adds, it is effective, not merely for the cure of the paroxysm, but of asthma itself. To weakly children, especially where there is a tendency to rickets, and appearances of scrofula, chalybeates may be given with well-grounded hope of advantage. Where they nauseate, gripe, or purge, which they sometimes do, proper adjuncts, especially aromatics and opiates, may be administered with them. When given with vegetable astringents, the inkiness of the mixture is sometimes an objection, though not always an important one, and there are several good tonic bitters which are not thus discoloured, such as quassia and calumba.

In availing ourselves of the remedial powers of iron, much will depend upon the proper selection of its preparations; of these the protoxide is a very efficient one, but, as it can scarcely be used in an isolated form, it is usually prescribed as a hydrated carbonate, or as separated from sulphate of iron by the action of alkalis. In the following formulæ of the Pharmacopœia, these decompositions are resorted to:—

MISTURA FERRI COMPOSITA.	COMPOUND MIXTURE OF IRON.
℞ Myrrhæ contritæ, drachmas duas,	Take of Myrrh, powdered, two drachms,
Potassæ Carbonatis, drachmam,	Carbonate of Potassa, a drachm,
Aquæ Rosæ, fluiduncias octodecim,	Rosewater, eighteen fluidounces,

Ferri Sulphatis contritæ, scrupulos duos cum semisse, Spiritûs Myristicæ, fluidunciam, Sacchari, drachmas duas;	Sulphate of Iron, powdered, two scruples and a half, Spirit of Nutmeg, a fluidounce, Sugar, two drachms;
Myrrham cum spiritu myristicæ et potassæ carbonate simul tere, hisque, inter terendum, primum aquam rosæ cum saccharo, deinde ferri sulphatem adjice. Misturam statim in vas vitreum idoneum immitte, idque obtura.	Rub the myrrh with the spirit of nutmeg and carbonate of potassa, and to them, while rubbing, first add the rose-water, with the sugar, then the sulphate of iron. Put the mixture immediately into a proper glass vessel, and stop it.

In this mixture the sulphate of iron is decomposed by the carbonate of potassa, and a green hydrated protocarbonate of iron is produced, which, however, soon becomes changed by the action of air, and acquires a brown tint; it should, therefore, be used as soon after its preparation as possible. It is nearly the same as the anti-hectic mixture of the late Dr. Griffith. It is said to be preferably prepared by selecting a lump of fine myrrh of the proper weight, and triturating it in the first instance into a perfectly even emulsion with the rose water; then adding the spirit of nutmeg, carbonate of potassa, and sugar; and, lastly, dissolving in it the sulphate of iron.

This mixture is an excellent tonic, and frequently admissible where other preparations of iron cannot be employed: if it feel uneasy upon the stomach, or gripe, an additional drachm of spirit of nutmeg may be added to each dose; sometimes it constipates, but that effect usually goes off after a few doses. From one to two ounces may be given, as occasion requires, from once to three times a day; ten drachms twice a day, namely, at noon, and an hour before dinner, is generally sufficient to begin with; and, if it agrees, it improves the appetite and the tone of the muscular fibre, and ameliorates the general complexion of the patient more safely and decidedly than most other chalybeates.

"It must be regarded as permanently serviceable in chlorosis and the numerous sympathetic affections connected with it. In the painful swellings which infest the breasts of chlorotic young women, I have found it almost a specific. I have also found it extremely valuable as an astringent in chronic diarrhœa; as soon as the fæces have become black, the bowels have generally retained their contents for a longer period." (Paris. *Pharmacologia.*)

The following is another formula which derives its activity from protocarbonate of iron, and in this, as in the former, myrrh is an excellent tonic adjunct.

Pilulæ Ferri Compositæ.	Compound Pills of Iron.
℞ Myrrhæ contritæ, drachmas duas, Sodæ Carbonatis, Ferri Sulphatis, Sacchari Fæcis, singulorum drachmam;	Take of Myrrh, in powder, two drachms, Carbonate of Soda, Sulphate of Iron, Treacle, of each, a drachm;
Tere myrrham cum sodæ carbonate; tum, adjectâ ferri sulphate, iterum tere; dein omnia, in vase priùs calefacto, simul contunde, donec corpus unum sit.	Rub the myrrh with the carbonate of soda; then, having added the sulphate of iron, rub the mixture again, and beat the whole together in a vessel previously warmed, until incorporated.

These pills are tonic and emmenagogue; they may be given in the dose of ten or fifteen grains two or three times a day, with any bitter infusion; they are a solid substitute for the *Mistura Ferri composita*, but the latter is a preferable chalybeate; the treacle prevents their becoming hard and insoluble by keeping.

The following is a similar pill, with the addition of aloes, and is preferable where the action of the bowels is sluggish:—

℞ Ferri Sulphatis,
Potassæ Carbonatis, āā ℈j.
Myrrhæ pulv. ʒj.
Aloes pulv. ʒss.
Tere simul ut fiat massa in pilulas xxx. dividenda, quarum sumantur ij. vel iij. nocte maneque.

The following is the only direct *protosalt* of iron contained in the Pharmacopœia:—

FERRI SULPHAS.	SULPHATE OF IRON.
℞ Ferri Ramentorum, uncias octo, Acidi Sulphurici, uncias quatuordecim, Aquæ, octarios quatuor;	Take of Iron Filings, eight ounces, Sulphuric Acid, fourteen ounces, Water, four pints;
Acidum sulphuricum aquâ misce, hisque adjice ferrum; tum calorem adhibe, et ubi bullulæ exire cessaverint, liquorem cola, et sepone ut fiant crystalli. Effusum liquorem consume ut in crystallos iterùm abeat. Has omnes exsicca.	Mix the sulphuric acid with the water, and to these add the iron; then apply heat, and when the bubbles have ceased to escape, strain the liquor, and set aside that crystals may be formed. Evaporate the liquor poured off, that it may again yield crystals. Dry them all.
NOTA.	NOTE.
FERRI SULPHAS (*crystalli*). Cœruleoviridis, in aquâ liquatur. Hic liquor, ferro immisso, nihil cupri demittit.	SULPHATE OF IRON (*crystals*). Blue green, is dissolved by water. This solution, when iron is put into it, does not throw down copper.

To this may be added, that the salt should be kept excluded from air, otherwise it becomes superficially brown from the absorption of oxygen, and the formation of a persulphate of iron, and it is then not perfectly soluble in water.

This sulphate of the protoxide of iron was formerly known under the name of *copperas*, *green vitriol*, and *salt of Mars;* it often occurs native, and is produced by the action of moist air upon certain varieties of *sulphuret of iron*, or *pyrites;* it is also prepared upon a large scale by exposing pyrites, previously roasted, to the action of air and water; it is not unfrequently held in solution by water which has percolated pyritiferous strata. All common green vitriol contains traces of copper, so that, for medical use, it requires to be prepared as above. The theory of the process is this: water is decomposed, and hydrogen evolved, the oxygen being transferred to the iron; the protoxide of iron thus produced combines with the sulphuric acid to form a protosulphate of iron, the crystals of which are obtained in the form of modified oblique rhombic prisms, of a blue-green colour, a strong styptic taste, soluble in two parts of cold water, and in about three-fourths of its weight of boiling, and crumbling down into a white or very pale-green powder when heated, in consequence of losing water of crystallisation; when distilled at a high temperature, anhydrous sulphuric acid passes over, formerly called *glacial oil of vitriol*, and peroxide of iron (*colcothar*, or *caput mortuum vitrioli*) remains in the retort.

The following are the components of the anhydrous and of the crystallised salt:—

	Atoms.	Equivalents.	Per Cent.
Protoxide of iron	1	36	47·4
Sulphuric acid	1	40	52·6
Anhydrous protosulphate of iron	1	76	100·0

And the composition of the crystals is—

	Atoms.	Equivalents.	Per Cent.
Protoxide of iron	1	36	25·9
Sulphuric acid	1	40	28·8
Water	7	63	45·3
Crystallised protosulphate of iron	1	139	100·0

This salt is decomposed by alkalis and their carbonates, yielding precipitates of hydrated protoxide and protocarbonate of iron, and, like the other ferruginous salts, is blackened by infusion of galls and most other vegetable astringents.

Sulphate of iron is chiefly employed as a tonic and emmenagogue; it has also been extolled as an anthelmintic, and was used as such in the time of Pliny. (*Nat. Hist.* lib. XXXIV. cap. xii.) It is seldom administered in solution, in consequence of the facility with which it is in that state decomposed; but is generally given in pills, combined with aromatics, The usual dose is from one to three grains; if it nauseates and occasions spasmodic pains of the stomach and bowels, it is generally prudent to desist from its use, and resort to some other form of iron.

As a tonic, in scrofulous habits, it may be given with a course of bark, or as follows:—

℞ Ferri Sulphatis, ℈j.
Extract. Cinchonæ, ʒj.
Divide in pilulas xx. una ter in die sumenda.

In amenorrhœa, with bitter extracts, or with myrrh, and occasionally aloes:—

℞ Ferri Sulphatis, gr. xij.
Extracti Gentianæ, ʒj.
Pulveris Cinnamomi composita, ʒss.
Fiat massa in pilulas xviij. dividenda, quarum capiat ægra duas ter in die, superbibendo haustum infusi alicujus amari.

Or with aloes, where the bowels require it:—

℞ Ferri Sulphatis,
Aloes,
Myrrhæ, āā ʒj.
Misce optime et fiat massa in pilulas quadraginta dividenda, quarum sumantur duæ bis vel ter die.

The propriety of administering preparations of iron with vegetable astringents has been doubted, because they form inky mixtures in consequence of the production of a *tanno-gallate of iron,* which may, however, be a good and effective chalybeate. Infusion of calumba, and infusion of quassia, may be administered with the salts of iron without such effect, so that those bitters are perhaps preferable where iron is given in solution, to those which contain astringent matter; it has, however, been supposed that the absorbents may possibly take up iron more readily when combined with vegetable matter, than when in a purely mineral form.

As an external application, sulphate of iron is of doubtful value. Its solution has been applied to cancerous sores and ill-conditioned ulcers. It has been used in fluor albus in the proportion of ℈iv. dissolved in f℥viij. of distilled water; and it has been recommended in the aphthæ of children. Where thus used, the solution should be prepared at the time it is wanted, in distilled water.

FERRI SESQUIOXYDUM.	SESQUIOXIDE OF IRON.
℞ Ferri Sulphatis, libras quatuor,	Take of Sulphate of Iron, four pounds,
Sodæ Carbonatis, libras quatuor et uncias duas,	Carbonate of Soda, four pounds and two ounces,
Aquæ ferventis, congios sex;	Boiling Water, six gallons;
Ferri sulphatem et sodæ carbonatem separatim liqua in aquæ congiis tribus; tum liquores inter se misce, et sepone, ut pulvis subsidat; deindè, effuso liquore supernatante, quod demissum est, id in aquâ lava, et exsicca.	Dissolve the sulphate of iron and the carbonate of soda separately in three gallons of water; then mix the liquors together, and set them by, that the powder may subside; then, having poured off the supernatant liquor, wash the precipitate with water, and dry it.

NOTA.	NOTE.
FERRI SESQUIOXYDUM. In acido hydrochlorico diluto, quam minimâ effervescentiâ totum liquatur; idque per ammoniam dejicitur.	SESQUIOXIDE OF IRON. It is entirely soluble in dilute hydrochloric acid, with very trifling effervescence; and it is precipitated by ammonia.

The effervescence arises from a small quantity of carbonic acid, there being a minute portion of carbonate of iron remaining in the dried precipitate; this proportion, however, is always unimportant and variable, for although, in the above process, a protocarbonate of iron is at first thrown down, it loses carbonic acid, and absorbs oxygen during exposure to air, and very little else than pure peroxide, or sesquioxide of iron, remains in the dry precipitate, after the sulphate of soda is thoroughly washed out of it. In the last Pharmacopœia this preparation was improperly called *Subcarbonate of Iron.* It is of a reddish-brown colour, and nearly tasteless.

Sesquioxide of iron is generally administered in powders, pills, or electuaries; when merely required as a tonic, it is combined with bitters and aromatics; and with myrrh, and aloes, or with valerian, and assafœtida, as an emmenagogue; it is, however, of doubtful efficacy. It has been given in doses of from five to twenty grains, or more, twice or thrice a day, but large doses are not apparently more active than small ones, and its efficacy is probably altogether dependant upon the state of the contents of the stomach. In the dose of from half a drachm to a drachm, or more, twice or thrice a day, it has been recommended by Mr. Hutchinson in tic doloureux, and by Dr. Elliotson in chorea. The following are formulæ for its administration:—

℞ Ferri Sesquioxydi, gr. x.
Pulveris Cinnamomi compos. gr. v.
M. fiat pulvis mane et meridie sumendus.

℞ Ferri Sesquioxydi, gr. x.
Pulveris Valerianæ, ʒss.
Syrup. Zingiberis, q.s.
Fiat bolus.

℞ Ferri Sesquioxydi,
Extracti Anthemidis, āā ʒss.
Misce et divide in pilulas xij. quarum sumat binas ter quotidie.

℞ Ferri Sesquioxydi, ʒj.
Pilul. Aloes c. Myrrha, ʒss.
M. et divide in pilulas xviij. duæ bis terve in die sumendæ.

℞ Ferri Sesquioxydi,
Confectionis Aurantii, āā ℥j.
Syrupi Zingiberis, q. s.
ut fiat electuarium cujus sumatur cochleare minimum bis vel ter die.

TINCTURA FERRI SESQUICHLORIDI.	TINCTURE OF SESQUICHLORIDE OF IRON.
℞ Ferri Sesquioxydi, uncias sex, Acidi Hydrochlorici, octarium, Spiritûs rectificati, octarios tres;	Take of Sesquioxide of Iron, six ounces, Hydrochloric Acid, a pint, Rectified Spirit, three pints;
Ferri sesquioxydo superinfunde acidum in vase vitreo, et per triduum digere, subindè agitans. Deinde spiritum adjice, et cola.	Pour the acid upon the sesquioxide of iron in a glass vessel, and digest for three days, occasionally agitating. Then add the spirit, and filter.

In this process the sesquioxide of iron and the hydrochloric acid mutually decompose each other, producing water and sesquichloride of iron; the latter is very soluble, both in water and in alcohol, and the tincture has a deep olive colour, an extremely styptic and astringent taste, and gradually acquires an ethereal odour. Mr. Phillips states the specific gravity of this tincture to be about, 992. It is decomposed by alkalis and alkaline carbonates, and renders vegetable astringents intensely black. Sesquichloride of iron, when obtained by heating pure iron in excess of gaseous chlorine, rises in the form of a crystalline sublimate composed of brown iridescent scales, and consisting of—

	Atoms.	Equivalents.	Per Cent.
Iron	1	28	34·2
Chlorine	1½	54	65·8
Sesquichloride of iron	1	82	100·0

The tincture of sesquichloride of iron (*Tinctura Ferri Muriatis* of former Pharmacopœiæ) is a definite and highly active chalybeate, and may generally be used as a substitute for other preparations of iron. It may be taken as a tonic in doses of five to thirty drops twice a day in a little water. In dyspepsia it may be given in small doses, in any bitter infusions, those being generally selected which are not blackened by it.

℞ Tincturæ Ferri Sesquichloridi, ♏lv.
Infusi Quassiæ,
Aquæ Cinnam. āā fʒvj.
Tincturæ Calumbæ, fʒj.
M. fiat haustus mane et meridie sumendus.

Like other chalybeates, it is apt in large doses to produce headache, harden the pulse, and occasion spasmodic pains of the stomach and bowels. If it constipate, a drachm of sulphate of magnesia may be added to each draught. If it produce diarrhœa, the bowels should be cleared with a little rhubarb and magnesia, and it may then be resumed generally without ill effect.

As a tonic after diseases of debility or depletion of the system, it requires, as well as the other preparations of iron, considerable circumspection in its use; if it induces no local inflammatory action or headache, and neither hardens nor materially quickens the pulse, it often proves eminently useful in restoring tone to the constitution.

With aloetics and antispasmodics it is an effective emmenagogue:—

℞ Tinct. Ferri Sesquichloridi, fʒss.
Tinct. Aloes compos.
Tinct. Valerianæ, āā fʒj.
M. sumatur cochleare unum minimum ex infusi anthemidis cyatho, bis vel ter quotidie.

Like other chalybeates it sometimes expels worms from the intestines. It is used as a styptic in internal hæmorrhages. In scrofulous affections it is a most valuable tonic, especially when it can be given in large doses. Dr. A. T. Thomson recommends the dose in these cases to be gradually increased up to 120 drops twice a day.

In retention of urine depending upon spasmodic stricture of the urethra, this solution of iron has been represented as having something like a specific action. Five or six drops have been recommended in such cases by Mr. Cline, every ten minutes, until nausea is produced. Dr. Davy observes that, in the cases in which he tried it, it produced no good effect till it nauseated; he recommends that, for this purpose, it should be given in a little tepid water; he could never discover traces of it in the urine, but, as it always blackens the fæces, it manifestly passes off by the bowels.

As an external application, the *Tinctura Ferri Sesquichloridi* has been applied to cancerous and other very ill-conditioned sores, but not with any marked success; it is said to be useful for the destruction of venereal warts.

There is a curious form of chloride of iron known in Germany under the name of "*Bestuscheff's Nervous Tincture*," the secret of which was purchased and published by the Empress Catherine of Russia. It is introduced into the Parisian *Codex* under the name of *Tinctura œtherea alcoholica de Muriate Ferri*, and is sometimes known as *La Motte's Golden Drops;* it is said to be peculiarly effective as an alterative tonic, especially in nervous affections. The following is the formula for its preparation, from the *Prussian Pharmacopœia:*—

℞ Ferri pulverati, quantum vis:
Solve in
Acid Muriatici sufficienti quantitate, cum Acidi Nitrici quarta parte mixta, et evapora. Massam siccam in cellam sepone, ut in liquorem coloris fusci saturati deliquescat.
Liquorem acceptum misce cum.
Ætheris Sulphurici duplo, conquassando. Ætherem hoc modo ferro soluto impregnatum, separa, et cum
Spiritûs Vini rectificatissimi duplo misce.
Mixtum in vitris oblongis, bene obturatis, radiis solis tamdiu expone donec color omnis evanuerit. Tum sollicitè serva.

FERRI AMMONIO-CHLORIDUM.

℞ Ferri Sesquioxydi, uncias tres,
Acidi Hydrochlorici, octarium dimidium,
Ammoniæ Hydrochloratis, libras duas cum semisse,
Aquæ destillatæ, octarios tres;

Acido hydrochlorico, in vase idoneo, ferri sesquioxydum misce, et in balneo arenæ digere per horas duas; deindè ammoniæ hydrochloratem in aquâ destillatâ priùs liquatam adjice; cola et liquorem omnem consume. Postremò quod restat in pulverem tere.

NOTA.

FERRI AMMONIO-CHLORIDUM. In spiritu tenuiori et in aquâ totum liquatur. Hic liquor, adjectâ potassâ ferri sesquioxydum demittit; potassâ suprà modum instillatâ, ammoniam ejicit.

AMMONIO-CHLORIDE OF IRON.

Take of Sesquioxide of Iron, three ounces,
Hydrochloric Acid, half a pint,
Hydrochlorate of Ammonia, two pounds and a-half,
Distilled Water, three pints;

Mix the sesquioxide of iron with the hydrochloric acid in a proper vessel, and digest in a sand-bath for two hours; then add the hydrochlorate of ammonia previously dissolved in the distilled water; filter, and evaporate the whole of the fluid. Lastly, rub what remains into powder.

NOTE.

AMMONIO-CHLORIDE OF IRON. It is entirely soluble in proof spirit and in water; this solution, on the addition of potassa, deposits sesquioxide of iron; potassa dropped in, in excess, evolves ammonia.

TINCTURA FERRI AMMONIO-CHLORIDI.

℞ Ferri Ammonio-Chloridi, uncias quatuor,
Spiritûs tenuioris, octarium;

Ferri ammonio-chloridum in spiritu liqua, et cola.

TINCTURE OF AMMONIO-CHLORIDE OF IRON.

Take of Ammonio-Chloride of Iron, four ounces,
Proof Spirit, a pint;

Dissolve the ammonio-chloride of iron in the spirit, and filter.

Ammonio-chloride of iron has long had a place in our Pharmacopœiæ under the name of *ferrum ammoniatum;* it is the *flores martiales*, *flores auri*, *ens martis*, and *calendula mineralis* of old pharmacy. By the present process a definite combination is obtained, and it is so far an improvement upon the old method, in which it was procured by sublimation, and was of uncertain composition. It is of an orange colour, inodorous, and of a saline and astringent taste, soluble in water and in alcohol, and composed, according to Phillips, of—

Sesquichloride of Iron	15
Hydrochlorate of Ammonia . . .	85
	100

There seems to be no good reason for retaining either the ammonio-chloride of iron, or its tincture, among the officinal preparations of iron; the sesquichloride is its active ingredient, and those who attribute any peculiar virtues to its union with hydrochlorate of ammonia might prescribe it extemporaneously. It was formerly employed not only as a tonic and alterative, but was almost regarded as a specific in epilepsy, and in hysteria; it is now rarely prescribed. Five to ten grains twice or thrice a day is an average dose.

FERRI IODIDUM.

℞ Iodinii, uncias sex,
Ferri Ramentorum, uncias duas,
Aquæ destillatæ, octarios quatuor cum semisse;

Iodinium aquæ octariis quatuor misce, hisque adjice ferrum. Calefac in balneo arenæ, et facto jam colore subviridi, liquorem effunde. Quod restat aquæ ferventis octario dimidio lava. Vaporent liquores commixti et colati calore gradum 212^{m}. non superante, in vase ferreo, ut exsiccetur sal. Hunc in vase benè obturato, intercluso luminis accessu, serva.

NOTA.

FERRI IODIDUM. Calore vapores violaceos emittit, ferri sesquioxydo superstite. Recèns præparatum in aquâ totum liquatur. Ex hoc liquore autem, in malè operto vase, sesquioxydum ferri citissimè dejicitur ut, non nisi filo ferri intromisso et vase bene obturato, limpidum servari possit.

IODIDE OF IRON.

Take of Iodine, six ounces,
Iron Filings, two ounces,
Distilled Water, four pints and a half;

Mix the iodine with four pints of the water, and to these add the iron. Heat in a sand-bath, and when it has attained a greenish colour, pour off the solution. Wash what remains with half a pint of hot water. Let the mixed and filtered solutions evaporate at a temperature not exceeding 212°, in an iron vessel, that the salt may become dry. Keep it in a well-stopped vessel excluded from the access of light.

NOTE.

IODIDE OF IRON. By heat it emits violaceous vapours, sesquioxide of iron remaining. Freshly-prepared it is entirely dissolved by water. But from this solution, in a badly-stopped vessel, sesquioxide of iron is very rapidly thrown down, so that, except with a wire of iron immersed in it, and in a well-stopped vessel, it cannot be kept clear.

When excess of pure iron filings is digested with iodine in water, a rapid combination ensues and a green solution is formed, which, by careful evaporation, out of the contact of air, yields green crystals of hydrated protiodide, which include five atoms of water. The iodide is constituted of—

	Atoms.	Equivalents.	Per Cent.
Iron	1	28	18·3
Iodine	1	125	81·7
Iodide of Iron	1	153	100·0

When obtained by fusion in an anhydrous state, this iodide is of a steel-gray colour and crystallized texture, very soluble in water and in alcohol, and very speedily decomposed by the action of air, which, as remarked in the above note, causes the formation of sesquioxide of iron. For medical use, this iodide is never required in the solid state, so that an officinal solution of it would have been a more convenient form, and this, with a coil of clean iron wire immersed into it, may be preserved without change.

Iodide of iron is an important therapeutic agent; it is a powerful chalybeate, and with this is combined the peculiar agency of iodine. Dr. A. T. Thomson, to whom we are chiefly indebted for our knowledge of its medicinal uses, observes, that its extreme solubility, formed of two active but little soluble bases, led him to introduce it to the notice of British practitioners, as a powerful therapeutic agent. "It is rapidly carried into the circulation, and may be detected in the urine and other secretions by testing them with chlorine and starch a short time after the iodide has been taken. It operates as a stimulant to the glandular system, while at the same time the iron supports and improves the tone of the habit. I have found it beneficial in scrofula in all its forms, chlorosis, atonic amenorrhœa, hysteria, secondary syphilis, and incipient cancer. In secondary syphilis, it may be combined with iodide of potassium; and in incipient cancer its efficacy is aided by the administration of iodide of arsenic at the same time. I have found it serviceable in atonic gastric dyspepsia, when combined with bicarbonate of potassa, and taken at the moment of admixture. The dose is from three to eight grains, or more." (*Lond. Disp.*)

FERRI POTASSIO-TARTRAS.

℞ Ferri Sesquioxydi, uncias tres,
Acidi Hydrochlorici, octarium dimidium,
Liquoris Potassæ, octarios quatuor et semisse, vel quantum satìs sit,
Potassæ Bitartratis, uncias undecim cum semisse,
Liquoris Ammoniæ Sesquicarbonatis, octarium, vel quantum satis sit,
Aquæ destillatæ, congios tres;

Ferri sesquioxydum acido misce, et per horas duas balneo arenæ digere. His aquæ congios duos adjice, et sepone per horam, tum liquorem supernatantem effunde. Quod demissum est, adjecto liquore potassæ, aquâ sæpius affusâ lava, et adhuc humidum cum potassæ bitartrate aquæ congio priùs mixtâ decoque. Si liquor, lacmo teste, acidus sit, ei ammoniæ sesquicarbonatis liquorem instilla, donec saturetur. Denique cola, et leni calore consumatur liquor ut sal siccus restet.

NOTA.

FERRI POTASSIO-TARTRAS. In aquâ tota liquatur. Hic liquor lacmi et curcumæ colorem non mutat. Nec a potassii ferrocyanido cœruleum fit; neque adjecto quovis alkali aut acido quicquid dejicitur. Magnes in ejus pulverem nullam vim exercet.

POTASSIO-TARTRATE OF IRON.

Take of Sesquioxide of Iron, three ounces,
Hydrochloric Acid, half a pint,
Solution of Potassa, four pints and a half, or as much as may be sufficient,
Bitartrate of Potassa, eleven ounces and a half,
Solution of Sesquicarbonate of Ammonia, a pint, or as much as may be sufficient,
Distilled Water, three gallons;

Mix the sesquioxide of iron with the acid, and digest them for two hours in a sand-bath. To these add two gallons of water, and set aside for an hour, then pour off the supernatant liquor. Having added the solution of potassa, wash what is precipitated frequently with water, and, while moist, boil it with the bitartrate of potassa, previously mixed with a gallon of the water. If the liquor, tested by litmus, be acid, drop into it solution of sesquicarbonate of ammonia, till it be saturated. Lastly, filter, and let the liquor be evaporated by a gentle heat, so that the salt may remain dry.

NOTE.

POTASSIO-TARTRATE OF IRON. It is entirely soluble in water. This solution does not change the colour of litmus and turmeric. Nor does it become blue by ferrocyanide of potassium; nor is anything thrown down from it by the addition of any alkali or acid. A magnet exerts no power over its powder.

To this note Mr. Phillips adds the following remarks (*Translation of the Pharmacopœia*). "When improperly prepared, as by using bitartrate of potash and iron filings, a large portion is usually insoluble in water, and sometimes it contains metallic iron, attracted by the magnet. Other salts of sesquioxide of iron give a blue precipitate with ferrocyanide of potassium, and the oxide is thrown down by any alkali. If the solution of this preparation act upon litmus paper, the tartaric acid of the bitartrate of potash is not saturated with the sesquioxide of iron."

A neutral prototartrate of iron may be obtained either by digesting pure iron filings in tartaric acid, or by mixing strong and hot solutions of protosulphate of iron and tartaric acid. In the latter case it forms nearly colourless crystals of a slight inky taste, and difficultly-soluble in cold water. Tartaric acid has little action on sesquioxide of iron, but when solutions of tartrate of potassa and sesquisulphate of iron are mixed in definite proportions, sulphate of potassa is thrown down and a blood-red solution of sesquitartrate of iron is formed.

The process of the Pharmacopœia is not calculated to afford a very definite result: the salt prepared according to it, is stated by Mr. Phillips to contain about 18 per cent. of sesquioxide of iron, and should consist of—

	Atoms.	Equivalents.	Per Cent.
Tartrate of Potassa	1	114	51·82
Sesquitartrate of Iron	1	106	48·18
Potassio-tartrate of Iron	1	120	100·00

In consequence, however, of uncertainty of composition, deliquescence, and, according to some, the tendency of its aqueous solution to decomposition, this is an inconvenient form of iron; its principal recommendation is said to be its tastelessness, but the specimens which I have examined have not this merit. Dr. Thomson represents it as possessing the same medicinal powers as the other preparations of iron, but from its mildness, slight taste, and ready solubility, it is a more convenient form for the administration of iron to children and in cases in which the other saline preparations of it prove nauseating and sit uneasily on the stomach. It is advantageously given in all the cases in which chalybeates prove useful, and it is also extolled as a remedy in dropsy, in which it is supposed to exert both a diuretic and tonic power. The dose is from ten grains to half a drachm, given either in a state of solution, or in the form of powder or pill, combined with an aromatic or a bitter, such as the extract of gentian. (*Lond. Disp.*)

Several combinations of iron with vegetable acids are found in old pharmacy and in foreign Pharmacopœiæ, but none of them are worth retaining, excepting, perhaps, the *Vinum Ferri*, made by digesting filings of soft iron in sherry, madeira, or other wines. Children will often take iron in this form more readily than in any other, and although the quantity contained in it is small, it generally proves a useful tonic.

FERRI PERCYANIDUM. *Percyanide of Iron. Prussian Blue.* This compound is obtained by the action of ferrocyanuret of potassium upon sesquisulphate of iron; it belongs to the class of *ferrosesquicyanurets*, and consists of seven atoms of iron and nine atoms of cyanogen; or of—

	Atoms.	Equivalents.	Per Cent.
Sesquicyanuret of Iron	4	268	62·2
Cyanuret of Iron	3	162	37·8
Prussian blue	1	430	100·0

Prussian blue is used in the preparation of cyanuret of mercury, and in that of the hydrocyanic acid; it has been administered internally in intermittent and remittent fevers, in epilepsy, and in neuralgia, in the dose of from one to four grains three or four times a day. An ointment composed of one drachm of Prussian blue and one ounce of lard or spermaceti ointment has been recommended as an application to ill-conditioned sores.

FERULA ASSAFŒTIDA, *see* ASSAFŒTIDA.

FICI. Figs. *Fructus siccus.* The *dry fruit* of the *Ficus Carica. Cl.* 23. *Ord.* 2. Polygamia Diœcia. *Nat. Ord.* Urticaceæ.

The fig-tree is a native of Asia. It flowers in June or July. Its bark is smooth and brown; it has many spreading branches; the leaves are large, scabrous, and irregularly divided into three or five lobes; the upper surface of the leaves is dark green with a pale longitudinal vein to each lobe; the under surface is pale green and downy, and its veins are raised and reticulated. It its early stage, the fruit serves as a common receptacle, and contains the male and female florets upon its inner surface; it is turbinate and umbilicate at the top, varied in colour, soft and fleshy.

When fully ripe, and in perfection, the fig is a mucilaginous, luscious, and peculiarly flavoured fruit. Figs are prepared for exportation by drying in ovens, and are then closely packed in cylindrical boxes or drums, and in small cases, in which they arrive in this country. They are mildly laxative, and when sliced and boiled in water, yield a sweet and mucilaginous decoction. When boiled or roasted they are used as an emollient poultice which is sometimes applied to boils or buboes; they form the most ancient cataplasm on record, for we read in the Second Book of Kings, (chap. xx. ver. 7), that it was resorted to for the relief of Hezekiah. "And Isaiah said, Take a lump of figs; and they took and laid it on the boil, and he recovered."

FŒNICULUM. *Fructus.* The *fruit* of the common fennel. *Fœniculum vulgare. Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

Fennel is a biennial, not uncommon on chalky soils; it flowers in July; it has a fusiform root; its stem is three or four feet high, erect, branching, leafy, and smooth. The leaves are alternate, tripinnate, composed of long, smooth, depending, linear leaflets, of a deep green colour: the flowers are in large, terminal, flat umbels; the petals five, ovate, emarginate, with their points turned inward; they are yellow; the filaments are also yellow, shorter than the petals, spreading, and bearing double anthers; the germen is inferior, covered by the nectary, and supporting two short styles, terminated by obtuse stigmas: the seeds are ovate, somewhat compressed, brown when ripe, three-ribbed, and encircled with a membranous margin.

Fennel seeds are generally imported from Italy. They are praised as carminative by old writers, but dill and caraway seeds being already in the Materia Medica, they might have been omitted, for the fennel water of the Pharmacopœia is of no importance, and scarcely ever prescribed, so that when found in the apothecaries' shops it is generally good for nothing.

Aqua Fœniculi.	Fennel Water.
℞ Fœniculi contusi, libram cum semisse,	Take of Fennel (seed), a pound and a half,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos;	Water, two gallons;
Destillet congius.	Let a gallon distil.

There are two species of fennel, the *common* and the *sweet;* it appears to be the fruit or seed of the latter which is intended to be used, although not so directed in the Pharmacopœia.

FOMENTATION. (Fomentatio.) Warm or hot water is the best fomentation, and when continuously supplied by flannel or sponge, softens, relaxes, and relieves pain from spasm or from inflammation. Medicated fomentations are not of much use, excepting that the materials of which they are composed, such as chopped herbs, or chamomile-flowers, when boiled in water and wrapped loosely in flannel, and applied to the part, serve to retain heat.

FOWLER'S SOLUTION, *see* Arsenic.

FOXGLOVE, *see* Digitalis.

FRAXINUS ORNUS, *see* Manna.

FUCUS VESICULOSUS. *Bladder Wrack.* *Cl.* 24. *Ord.* 3. Cryptogamia Algæ. *Nat. Ord.* Algæ.

This is a common marine plant. The root is a black woody disk; the frond smooth, glossy, one to four feet long, and half an inch to an inch and a half broad, of a dark olive colour, linear, and dichotomous; it has a blackish midrib; in the membranous part are thin spherical vesicles of air, varying in size from a pea to a hazel-nut, and always close to the midrib; the fructification, which it bears in spring, consists of compressed, turgid, solitary, or twin receptacles at the ends of the branches; roundish, perforated, and full of mucus. When this plant is dried, it becomes black and brittle, and when burnt to a coal or imperfect ash, was formerly used as a substitute for burnt sponge: it doubtless derived its efficacy from iodine, but in consequence of the more definite preparations of that substance now in use, it has been properly omitted in the present Pharmacopœia.

Fresh sea-weed is sometimes applied to indolent glandular tumours; it should be often renewed, so as to keep up a stimulating action upon the skin.

FUMIGATION. (Fumigatio.) This term is generally applied to the diffusion of chlorine and of acid vapours through the atmosphere, and to their application to clothes and other goods, with a view of destroying infection and contagion. It is also employed in reference to the therapeutic application of fumes or vapours to different parts of the body; sulphurous, mercurial, and other vapours are thus applied, in what are termed *fumigating baths.*

GALBANUM. *Gummi-resina.* The gum-resin of the *Galbanum officinale.* This substance is the produce of an umbelliferous plant which is a native of Persia. It is imported from the Levant, and is usually in mottled masses of a yellow or pale brown colour, composed apparently of an aggregation of guttiform pieces, and generally mixed with many impurities; it has a peculiar and slightly-fetid odor, and a bitterish and warm taste. Like other gum-resins, it forms a milky mixture with water, and is only partially soluble in alcohol. The following, according to Meissner, are the proximate constituents of galbanum:—

Volatile oil	3·3
Resin	65·8
Gum	22·6
Bitter extract, with malic acid . .	0·2
Bassorin	1·8
Water	2·8
Impurities and loss	3·5

The medical virtues of galbanum are not very important; it forms an ingredient in some expectorant formulæ, and as an antispasmodic and deobstruent, it is placed by writers on the Materia Medica between ammoniacum and assafœtida.

PILULÆ GALBANI COMPOSITÆ.	COMPOUND GALBANUM PILLS.
℞ Galbani, unciam,	Take of Galbanum, an ounce,
Myrrhæ,	Myrrh,
Sagapeni, singulorum unciam cum semisse,	Sagapenum, of each an ounce and a half,
Assafœtidæ, unciam dimidiam,	Assafœtida, half an ounce,
Syrupi, quantum satìs sit;	Syrup, as much as may be required.
Simul contunde, donec corpus unum sit.	Pound them together till they are incorporated.

These are useful pills, especially as relates to the myrrh and assafœtida; the galbanum and sagapenum are not of much importance to their general merits. From five to fifteen or twenty grains may be taken every night, or night and morning, in those cases in which assafœtida is prescribed; more especially in hysteria accompanied by deranged menstruation and chlorosis, and in some forms of asthma, and spasms of the stomach.

Emplastrum Galbani.	Plaster of Galbanum.
℞ Galbani, uncias octo,	Take of Galbanum, eight ounces,
Emplastri Plumbi, libras tres,	Plaster of Lead, three pounds,
Terebinthinæ vulgaris, drachmas decem,	Common Turpentine, ten drachms,
Abietis Resinæ, uncias tres;	Resin of the Spruce Fir, powdered, three ounces;
Galbano et terebinthinæ simul liquefactis, primò abietis resinam, deinde emplastrum plumbi lento igne liquefactum adjice, atque omnia misce.	To the galbanum and turpentine melted together, first add the resin of the spruce fir, and then the lead plaster liquefied by a gentle heat, and mix them all.

Galbanum plaster is stated to be "stimulant and suppurative, and also advantageously applied to scrofulous tumours; to joints long affected with arthritic pains; and to the loins in rickets; also as a suppurative to excite indolent tumours, and to reduce the induration which often remains around discharged abscesses." (*Lond. Disp.*) It is no doubt a good adhesive and stimulating plaster, but whether any virtues of the galbanum compensate for its disagreeable smell, seems questionable.

GALIPEA, *see* CUSPARIA.

GALLÆ. The diseased buds (*gemmæ morbidæ*) of the Dyers' Oak: *Quercus infectoria*. *Cl.* 21. *Ord.* 6. Monœcia Polyandria. *Nat. Ord.* Cupuliferæ.

It appears from the evidence of Olivier, that the galls of commerce are derived from the above species of oak, though there are others which also produce them: the following is his description of the tree. The *Quercus infectoria* is scattered throughout Asia Minor, from the Bosphorus as far as Syria, and from the coast of the Archipelago as far as the frontiers of Persia. It has a crooked stem, seldom exceeds six feet in height, and more frequently assumes the characters of a shrub than of a tree. The leaves, which are deciduous in autumn, are on short petioles, smooth, of a bright green colour on both sides, and obtusely toothed; the acorn is elongated, smooth, two or three times longer than the cup, which is sessile, in a slight degree downy and scaly: the gall comes at the shoots of the young boughs, and acquires from four to twelve lines in diameter; the insect which produces it is the *Cynips quercifolii* of Linnæus, a small hymenopterous insect with a fawn-coloured body, dark antennæ, and the upper part of the abdomen of a shining brown. The insect punctures the tender shoot with its sting, which is spiral, and deposits its egg in the puncture; this occasions a morbid irritation in the part, and the gall rises in a few hours, attaining its full size in a day or two, before the larva is hatched; the egg grows with the gall, and it is by the irritation which it keeps up, that the morbid excitement sufficient for the production of the gall is kept up. The galls are gathered before the larva changes to a fly and eats its way out, for then the galls are lighter and less astringent. The finest galls are imported from Aleppo and Smyrna. Their taste is extremely astringent and somewhat bitter, their surface tubercular, and of a deep blueish-gray, or olive colour. Those which are light in weight and colour, and which, instead of breaking dense and resinous, are hollow and pulverulent, are of inferior quality. Their principal active and soluble ingredients are, according to Davy, tan and gallic acid; he obtained the following proximate principles from Aleppo galls:

Gallic acid	6·2
Tannin	26·0
Gum	2·4
Calcareous and other salts	2·4
Woody fibre	63·0
	100

Pelouze has rendered it probable that the gallic acid of the gall-nut is the consequence of the action of air upon its tannin or tannic acid. (*Ann. de Chim. et Phys.* LIV.)

As an article of the Materia Medica, galls are a powerful astringent, but they are not often used. In relaxation of the palate and uvula the following is a good astringent gargle:

℞ Gallarum contusarum, ʒij.
Aquæ ferventis, f℥xij. infunde per horas tres, et cola.

℞ Colati Infus. f℥vij.
Spir. Vini Rectificat. f℥j. M.

By the natives of India, galls are employed in the treatment of intermittents and of dysentery. In *blind piles*, the following ointments have been used with singular advantage:

℞ Gallarum pulver. ʒj.
Ung. Cetacei, ʒvij. M.

℞ Gallarum pulveris, ʒj.
Camphoræ, ʒss.
Tincturæ Opii, fʒij.
Cerati, ℥j.
M. fiant unguentum nocte, et mane applicandum.

℞ Morphiæ, gr. ij.
Olei Olivæ, ʒij. tere optime simul, et adde
Unguenti Zinci, ℥j.
Pulv. Gallarum, ʒj. fiat unguentum.

Or the following officinal ointment:

UNGUENTUM GALLÆ COMPOSITUM.	COMPOUND OINTMENT OF GALLS.
℞ Gallæ subtilissimè contritæ, drachmas duas,	Take of Galls very finely powdered, two drachms,
Adipis, uncias duas,	Lard, two ounces,
Opii duri contriti, drachmam dimidiam;	Hard Opium powdered, half a drachm;
Misce.	Mix.

In cases of fluor albus, hæmorrhoids, and prolapsus ani, a fomentation may be used, composed of an ounce of bruised galls, macerated for an hour in a quart of water, strained, and applied cold: as an occasional addition to astringent gargles, as well as for internal use, the following tincture, of the Pharmacopœia is sometimes convenient.

Tinctura Gallarum.	Tincture of Galls.
℞ Gallarum contritarum, uncias quinque,	Take of bruised Galls, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

This is also a delicate test of the presence of iron, which it indicates by a blue or black cloud.

GARGARISMA (γαργαριζειν, *to wash the throat*). A lotion, or *gargle* for the throat.

GELATIN (gelare, *to congeal*). A proximate principle of animals, contained in soft solids, and especially in the cutis and membranes; it is also extracted from bone and some kinds of horn. It is insipid and colourless, soluble in hot water, and the solution, if sufficiently concentrated, gelatinises on cooling. When dry, gelatin is extremely permanent, but its aqueous solution soon putrefies; it is detected by the insoluble precipitate which is produced in its solutions by tannin, and by sulphate of platinum. Isinglass is nearly pure gelatin; it is also procured by boiling hartshorn-shavings, and when obtained from these sources is much used as an article of food: glue and size are impure varieties of gelatin.

GENTIANA (from Gentius, king of Illyria, who is said to have discovered its virtues). *Radix.* The root of the *Gentiana lutea.* *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Gentianeæ.

This species of gentian is abundant in the Swiss and Austrian Alps, and in the mountainous forests of many parts of Germany; in the Pyrenees, and in North America. The root is thick, long, and cylindrical. The lower leaves are petiolate, large, spear-headed, stiff, with five veins on the back, and of a yellow-green colour; the leaves of the stem are concave, smooth, and egg-shaped, sessile, and almost embracing the stem, which is two or three feet high; the flowers are in whorls at the upper joints, large, yellow, and peduncled; the calyx is a membranous deciduous spathe, and bursts on the side when the flower opens. The corolla is divided into five or eight narrow spreading segments, elliptical and speckled; the filaments are shorter than the corolla, and furnished with long, erect anthers; the germen is conical, crowned with two sessile, reflected stigmas, and becomes a conical capsule, containing many small seeds.

The best gentian roots are imported from Germany and France, in contorted pieces of various sizes, covered with a brownish wrinkled epidermis. When broken, they exhibit a brown bark, surrounding an interior yellow and more fibrous part; they should be tough and flexible, and free from worms. Gentian is intensely bitter, accompanied by a slight sweetness, which, in fine specimens, is very manifest on touching the tongue with the broken surface of the root. Its active parts are soluble in alcohol and in water. Its proximate components are, according to Henry and Caventou, a peculiar crystallisable principle, to which its bitterness is referable, together with extractive and saccharine matter, gum, and traces of oil, acid, and saline matters, together with woody fibre.

The following are the officinal preparations of gentian in the present Pharmacopœia:

EXTRACTUM GENTIANÆ.	EXTRACT OF GENTIAN.
℞ Gentianæ concisæ, libras duas cum semisse,	Take of Gentian, sliced, two pounds and a half,
Aquæ destillatæ ferventis, congios duos;	Boiling distilled Water, two gallons;
Macera per horas viginti quatuor; tum decoque ad congium, et liquorem adhuc calentem cola; denique ad idoneam crassitudinem consume.	Macerate for twenty-four hours; then boil down to a gallon, and strain the liquor whilst hot; lastly, evaporate to a proper consistency.

INFUSUM GENTIANÆ COMPOSITUM.	COMPOUND INFUSION OF GENTIAN.
℞ Gentianæ concisæ,	Take of Gentian, sliced,
Aurantii Corticis exsiccati, singulorum drachmas duas,	Dried Orange-peel, of each two drachms,
Limonum Corticis recentis, drachmas quatuor,	Fresh Lemon-peel, four drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horam, in vase levitèr clauso et cola.	Macerate for an hour, in a lightly-covered vessel, and strain.

TINCTURA GENTIANÆ COMPOSITA.	COMPOUND TINCTURE OF GENTIAN.
℞ Gentianæ concisæ, uncias duas cum semisse,	Take of Gentian, sliced, two ounces and a half,
Aurantii Corticis exsiccati, drachmas decem,	Dried Orange-peel, ten drachms,
Cardamomi contusi, drachmas quinque,	Bruised Cardamoms, five drachms,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

MISTURA GENTIANÆ COMPOSITA.	COMPOUND MIXTURE OF GENTIAN.
℞ Infusi Gentianæ Compositi, fluiduncias duodecim,	Take of Compound Infusion of Gentian, twelve fluid ounces,
Infusi Sennæ Compositi, fluiduncias sex,	Compound Infusion of Senna, six fluid ounces,
Tincturæ Cardamomi Compositæ, fluiduncias duas;	Compound Tincture of Cardamoms, two fluid ounces;
Misce.	Mix.

The extract of gentian is a good simple bitter extract; it is seldom employed alone, but chiefly as a vehicle for, or adjunct to, certain mineral tonics; its consistence is well adapted for pills. Good gentian yields about half its weight of it. The following pills are useful where tonics of this class are indicated:

℞ Ferri Sulphatis, ℈j.
Myrrhæ Pulver.
Extract. Gentianæ, āā ʒj.
Divide in pilulas xxx. sumantur ij. bis vel ter quotidie.

In cases of obstinate heartburn, with a gouty habit, the folowing has been found useful:

℞ Extract. Gentianæ,
Ammoniæ Sesquicarbonat. āā ʒj.
M. fiat pilul. xxx. Sumantur duæ bis vel ter die.

The compound infusion of gentian is one of the most elegant and useful bitters of pharmacy, but it is apt to spoil and become decomposed in warm rooms and warm weather, and should be prepared fresh every day. In dyspepsia, attended by acidity, it may be employed as a vehicle for magnesia, or the alkalis; in other cases, it may be prescribed with acids, and where the bowels require it, with small doses of sulphate of magnesia, as in the following formulæ:

℞ Magnes. Carbonat. ℈j.
Infus. Gentian. compos.
Aq. Cinnamomi, āā fʒvj.
Tincturæ Cardamomi compos. fʒj.
M. fiat haustus ante prandium et hora somni sumendus.

Where dyspepsia is attended by nausea, and aversion to food, the following is a good form:

℞ Infus. Rosæ compos.
Infus. Gentianæ compos. āā fʒvj.
Tinct. Gentianæ compos. fʒj.
Acid. Sulphur. dilut. ♏x.
M. fiat haustus ter die sumendus.

The *Compound Gentian Mixture* is useful in some cases of habitual constipation accompanied by dyspepsia, but its tendency to decomposition is such, that it cannot be long kept, and should therefore have been left to extemporaneous prescription.

GEOFFRŒYA INERMIS. The Cabbage-tree. *Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Leguminosæ.

This tree is a native of Jamaica. Its bark was introduced into medicine by Dr. Wright, as an anthelmintic; it has a sweetish, nauseous flavour, and operates as a cathartic; it appears also to possess the characters of a narcotic. The decoction appears to be the best form for its exhibition; it is prepared by boiling one ounce of the bruised bark in a quart of water, down to a pint; of which an ounce and a half, or two ounces, is a dose; it may be repeated every four or six hours till it nauseates. In overdoses it occasions sickness and feverish delirium, which are removed by warm water and castor oil; it is not, however, a remedy used in this country.

GLYCYRRHIZA (γλυκυς, *sweet*, ῥιζα, *root*). *Radix recens.* The *fresh root* of *Glycyrrhiza glabra. Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Leguminosæ.

This plant is a native of the south of Europe. It is much cultivated for medical use near London. It has a long, round, succulent, tough root, running to a considerable extent, brown externally, yellow within, and of a peculiar sweet taste. The stalks are erect, strong, herbaceous, striated, furnished with few branches, and four or five feet high; the leaves are pinnated, alternate, composed of several pairs, and one terminal pinna; the leaflets are ovate, obtuse, veined, of a pale-green, and stand upon short footstalks; the flowers are papilionaceous, purplish, and upon long spikes, arising from the axillæ of the leaves; the calyx is tubular, and divided into two narrow, pointed segments; the corolla consists of an ovate, lanceolate, obtuse, erect, concave vexillum, two oblong, obtuse alæ, and a shorter carina. The filaments are ten, nine of which are united at the base, bearing simple, roundish anthers; the germen is short, with a tapering style and blunt stigma. The seeds are small, kidney-shaped, and produced in a pod, which is oblong, compressed, pointed, one-celled.

The principal proximate constituents of liquorice-root are woody fibre, starch, and a peculiar modification of sugar, which has been termed *glycion*, or *glycyrrhizin*, characterised by forming difficultly-soluble compounds with the acids.

Liquorice-root, and its extract, are chiefly used as demulcents; they are also often added to bitter and nauseous medicines, with a view of covering their flavour, particularly with regard to aloes. The chief consumption of liquorice is in the preparation of the extract, which is imported from the South of Europe, under the name of *Spanish juice;* it is usually burned, and otherwise carelessly prepared, and adulterated, and often contains copper, derived from the pans in which the decoction of the root is evaporated.

The *Extractum Glycyrrhizæ* of the Pharmacopœia, is prepared in the same way as the *Extractum Gentianæ.* The fresh root yields upon an average about one-fourth of its weight of extract.

GRANATUM. The Pomegranate. *Fructus Cortex.* The *bark* or *rind* of the fruit of the *Punica granatum. Cl.* 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Myrtaceæ.

This tree is a native of the south of Europe, and will bear the winters of our climate; its fruit comes to most perfection in the West Indies; it sometimes attains a height of more than twenty feet, and abounds in branches, some of which are thorny; the leaves are opposite, about three inches in length, and half an inch in breadth, entire, pointed at each extremity, and of a clear green; the flowers are three or four together, terminal, and sessile; the calyx is red, fleshy, and divided into five pointed segments; the petals are of a scarlet colour, and wrinkled; the fruit is pulpy, cellular, many-seeded, and crowned with the calyx; it is about the size of an orange, and has a tough and highly astringent rind; the pulp is red, succulent, and somewhat acid.

Davy found in 100 parts of pomegranate peel—

Tannin	18·8
Extractive	10·8
Mucilage	17·1
Resin	0·4
Woody fibre	30·0
Water and loss	22·9
	100

The decoction or infusion of the bark of the pomegranate is a powerful astringent. It is sometimes employed as an injection in leucorrhœa, a gargle in relaxed sore throat, and a lotion in some cutaneous eruptions. In India, the decoction is used as a remedy for tape-worm. The flowers are also astringent, and were formerly used under the name of *Balaustina Flowers.*

DECOCTUM GRANATI.	DECOCTION OF POMEGRANATE.
℞ Granati, uncias duas,	Take of (the dried rind of the) Pomegranate, two ounces,
Aquæ destillatæ, octarium cum semisse;	Distilled Water, a pint and a half;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

GUAIACI LIGNUM ET RESINA. The *wood* and the *resin* of the *Guaiacum officinale. Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Zygophylleæ.

The guaiacum tree is a native of Jamaica, Hispaniola, and the warmer parts of South America. It grows to about forty feet high, and four or five in circumference, with many divided knotted branches. The bark is gray and speckled, and upon the branches ash-coloured. The leaves are pinnated, consisting of two or three pairs of pinnæ, with short footstalks. The flowers grow in umbels, springing from the divisions of the smaller branches. The calyx consists of five leaves, which are concave, oblong, obtuse, spreading, unequal, and deciduous. The petals are five, blue, elliptical, concave, and spreading; the stamens are erect and villous, with yellow hooked anthers; the germen is oval, with a short style and simple stigma: the capsule is subturbinate, on a short pedicel, smooth, pentagonous, and five-celled; the seeds are solitary, hard, and angular.

The *wood* is imported chiefly from Jamaica, and much esteemed, on account of its hardness, for turnery wares. Its specific gravity is 1·33; it is yellow externally, and dark-brown in its interior. When heated, it emits a slightly aromatic odour. The resin, though possessed of certain characters of the resins, is, in other respects, distinct, and must be regarded as a body *sui generis* (*Phil. Trans.*, 1806). Its most remarkable property is the change of colour which it undergoes when subjected to oxydizing agents. It is sometimes met with in tears, but its usual appearance is that of large fused masses with little smell and taste, brittle, and semi-transparent, and of a greenish-brown colour. The tint of its recent powder is pale gray, but by exposure to air and light it soon becomes of a dingy green, a change which Dr. Wollaston found was most speedily effected in the violet rays of the prismatic spectrum. It is sometimes adulterated by common resin.

Guaiacum *wood* forms one of the ingredients in the compound decoction of sarsaparilla. It derives its efficacy from the resin diffused through it. Its decoction was at one time considered as a specific against the venereal disease, but experience has annulled its pretensions, nor does it deserve any confidence in cutaneous affections, except as a part of a diaphoretic regimen.

Guaiacum *resin* forms an ingredient in the *Pulvis Aloes compositus* (page 34), and is the basis of the following formulæ of the Pharmacopœia:

MISTURA GUAIACI.	MIXTURE OF GUAIACUM.
℞ Guaiaci Resinæ, drachmas tres, Sacchari, unciam dimidiam, Misturæ Acaciæ, fluidunciam dimidiam, Aquæ Cinnamomi, fluiduncias novendecem; Tere guaiacum cum saccharo, deinde cum misturâ acaciæ, hisque, inter terendum, aquam cinnamomi paulatim adjice.	Take of Guaiacum Resin, three drachms, Sugar, half an ounce, Mixture of Acacia, half a fluid ounce, Cinnamon Water, nineteen fluid ounces; Rub the guaiacum with the sugar, then with the mixture of acacia, and to these, whilst rubbing, gradually add the cinnamon water.

TINCTURA GUAIACI.	TINCTURE OF GUAIACUM.
℞ Guaiaci Resinæ contritæ, uncias septem, Spiritûs rectificati, octarios duos; Macera per dies quatuordecim, et cola.	Take of Guaiacum Resin, powdered, seven ounces, Rectified Spirit, two pints; Macerate for fourteen days, and filter.

TINCTURA GUAIACI COMPOSITA.	COMPOUND TINCTURE OF GUAIACUM.
℞ Guaiaci Resinæ contritæ, uncias septem, Spiritûs Ammoniæ Aromatici, octarios duos; Macera per dies quatuordecim, et cola.	Take of Guaiacum Resin, powdered, seven ounces, Aromatic Spirit of Ammonia, two pints; Macerate for fourteen days, and strain.

Guaiacum, conjoined with diaphoretics and stimulants, has long had the reputation of relieving chronic rheumatism, but it is of doubtful efficacy, and, where effective, the benefit is rather to be referred to the adjuncts. The average dose is fifteen grains three times a day, conjoined with nitre, antimonials, and opiates. It is best given suspended by mucilage of gum arabic, in the form of a draught, or as an electuary with honey. The above *Mistura Guaiaci* is given in the dose of one or two table-spoonsful twice or thrice a day. The *Tinctura Guaiaci composita* is also a favourite composition; the simple tincture is not of much use.

Guaiacum generally disagrees with the stomach, and excites dyspepsia; when, however, it is thought right to administer it, the following formulæ may be adopted:—

℞ Pulver. Resin. Guaiaci, gr. xv. tere cum
Mucilaginis Acaciæ, ʒj., et adde
Potassæ Nitratis, gr. v.
Aquæ Cinnamom. fʒx.
Syrup. Papaver. fʒss.
M. fiat haustus ter die sumendus.

℞ Pulveris Resinæ Guaiaci, ʒij.
Pulveris Potassæ Nitratis, ʒj.
Sulphuris Sublimati, ℥ss.
Pulv. Zingiberis, ʒj.
Mellis Despum. ℥ij.
M. fiat electuarium; sumat coch. j. min. quater die.

℞ Tinct. Guaiaci compos.
Mellis, āā ʒj., tere simul et adde
Aquæ Pimentæ, fʒx.
M. fiat haustus ter die sumendus.

Combinations of guaiacum are liable to change colour, especially where it is united with the *Spiritus Ætheris Nitrici*, with which it forms a vegetable chameleon, a circumstance which should be explained to the patient, who may otherwise be alarmed at the non-identity of his medicine.

HÆMATOXYLUM. *Lignum.* The *wood* of the *Hæmatoxylon Campechianum.* *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Leguminosæ.

This tree is a native of South America, and thrives in perfection at Campeachy, in the Bay of Honduras. The trunk and branches are very crooked, and covered with a dark bark; the smaller ramifications are numerous and prickly; the leaves are pinnated, composed of four or five pairs, irregularly oval, obliquely-nerved, and obtusely sinuated at the top; the flowers grow in racemi; the calyx divides into five oblong, obtuse segments; the petals are five, spreading obtusely, lance-shaped, and reddish-yellow; the stamina are tapering, unequal, shorter than the corolla, and the anthers small and oval; the style is nearly of the length of the stamens, and the germen becomes a long, double-valved pod, which contains many oblong, compressed seeds.

Logwood has a peculiar faint smell, and a sweet astringent taste; its chief consumption is as a dye-stuff. In the Materia Medica it ranks with the astringent tonics, and as such has been used in diarrhœa, dysentery, and dyspepsia. It frequently stains the stools of a deep blood-red, or purple colour. Chevreul has described the principle upon which the colour of logwood depends, under the name of *hæmatin.*

The *extract*, prepared according to the direction of the Pharmacopœia, is the best form for the administration of logwood; it may be given in the dose of from ten to twenty grains.

℞ Extracti Hæmatoxyli, gr. x.
Misturæ Cretæ,
Aquæ Cinnamomi, āā fʒvj.
Misce pro haustu bis terve in die sumendo.

Or in the form of mixture:—

℞ Extracti Hæmatoxyli, ʒj.
Misturæ Cretæ, f℥vij.
Tincturæ Cardamomi, f℥j.
Fiat mistura cujus sit dosis cochlearia tria magna subinde.

HELENIUM, *see* Inula.

HELLEBORUS. *Radix.* The *root* of the *Helleborus officinalis. Cl.* 13. *Ord.* 6. Polyandria Polygynia. *Nat. Ord.* Ranunculaceæ.

This is commonly termed *black hellebore*, from the dark colour of its root: the plant is also known in our gardens under the name of *Christmas rose;* it is the *Melampodium* of the ancients. It flowers from December till February. It is a native of Austria and of Italy. It has a perennial, rough, knotted root, black externally, whitish within, and sending off many strong, round, long fibres; the flower-stalks are erect, round, tapering, and reddish towards the bottom; the bracteal leaves supply the place of the calyx, and are oval, concave, and generally indented at top; the petals are five, large, roundish, spreading, at first white, but afterwards reddish and greenish; the nectaries are about eight, tubulated, compressed, two-lipped, and greenish-yellow; the filaments are white, and the anthers yellow; the germens vary from four to eight, and the pods contain many oval, shining, blackish seeds; the leaves are compound, pedated, and stand upon long radical footstalks; the simple leaf is elliptical, smooth, and serrated at top.

The root of this species of hellebore has a bitterish and acrid flavour, producing a peculiar tingling upon the tongue; it is virulently cathartic, and consequently hydragogue and emmenagogue. "It is one of the most ancient articles of the Materia Medica. Ctesias, who lived in the time of Plato, and anterior to Hippocrates, speaks of it as a medicine of important virtues. By the Greek and Roman physicians, it was highly esteemed as a remedy in mania. The extraordinary cures performed at the island of Antecyrus, famous for its hellebore, are celebrated by poets and historians of antiquity." (Paris. *Pharmacologia.*)

Eight or ten grains of the powdered root is usually an active dose, but the only form in which it ever is prescribed in this country is the *tincture*, the dose of which is from twenty minims to a drachm; it is regarded as alterative and emmenagogue. In purgative doses the other cathartics are preferable, and the cases are extremely rare which justify its use. Dr. Paris states that it forms an ingredient in several quack medicines.

Tinctura Hellebori.	Tincture of Hellebore.
℞ Hellebori contusi, uncias quinque,	Take of Hellebore Root, bruised, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

In overdoses, hellebore acts as an acro-narcotic poison. Orfila found that two drachms killed a dog in eighteen hours when taken by the mouth, and in two hours when applied to a wound. Two cases are quoted by Dr. Christison from the bulletins of the *Société Médicale d'Emulation* (Avril, 1818), which arose from the ignorance of a quack doctor. After taking a decoction of the root, both persons were seized in forty-five minutes with vomiting, then with delirium, and afterwards with violent convulsions. One died in less than two hours, and the other in two hours and a half.

In another case, cited by the same author, upon the authority of Dr. Fahrenhorst, a German physician, and where the patient recovered, the symptoms were those of irritant poisons generally, that is, burning pain in the stomach and throat, violent vomiting, to the extent of sixty times in the first two hours, cramps of the limbs, and cold sweating. The most material symptoms were at this time quickly subdued by sinapisms to the belly, and anodyne demulcents given internally. The dose here was a table-spoonful of the root in fine powder. Of the other species of hellebore, the *Helleborus fœtidus* is said to be the most poisonous; they all probably possess similar properties.

HELONIAS, *see* SABADILLA.

HENBANE, *see* HYOSCYAMUS.

HIRUDO. The Leech. *Hirudo medicinalis*, Cuvier. *Div.* 3. *Cl.* 1. Articulata Annelidæ.

The medicinal leech is found in ponds and lakes, and appears not uncommon over the whole world. The London market was at one time chiefly supplied from Norfolk and Suffolk, but of late they have been imported from France and Lisbon. They are caught either by disturbing the water, when they come to the surface, and are taken by the hand, or by people who walk into the pools and suffer them to fix upon their legs.

The back of the genuine leech is very dark olive, divided by four paler lines; the belly is pale olive, and spotted. The mouth consists of two lips, placed in the centre of a horseshoe-shaped sucker, and within it are three small cartilaginous teeth, by which they make a triangular puncture in the skin. They are oviparous and androgynous; each egg produces nine leeches, which escape from it in about twenty-eight days. The eggs are deposited upon the margin of pools, and are hatched by the sun's heat. During winter, leeches remain attached to the roots of aquatic plants, but in warm weather they move about, and are said always to be upon the surface during a thunder-storm.

When leeches are to be applied, the part should be made perfectly clean and dry, and the leech, after having been well wiped in a soft towel, should be so held as to enable it to fix upon the spot required, which, if necessary, may be touched with a drop of cream, fresh milk, or beer. It is generally most convenient to apply the leeches successively by the hand, but where many are required, and the surface to which they are to be applied extensive, they may be put into a wine-glass, or small tumbler, or pill-box, and so held to the part till they fix. When applied to a very limited spot, the leech may be put into a short glass tube, open at both ends. It is sometimes necessary to make a small puncture with the point of a lancet, or to put a drop of blood upon the spot. The average quantity of blood which a leech extracts is from two drachms to half an ounce; when full they fall off, or may at any time be made to drop by touching their heads with salt; the bleeding may then be kept up by bathing the orifices with a sponge dipped in warm water, and when it does not stop spontaneously, it may be checked by the application of a piece of soft dry lint. It however sometimes happens that the hæmorrhage from a leech bite is extremely troublesome, and has even proved fatal in the cases of young children; in such obstinate cases a ligature of thread must sometimes be resorted to: among the most effectual styptics a strong solution of alum seems to answer best. In some persons the bites produce great local irritation, and œdema; this is especially the case in erysipelatous habits. There are also particular kinds of leeches which are said to produce troublesome and even dangerous sores, but common attention will prevent such occurrences. When it is desired to preserve leeches for second use, they are made to disgorge by the application of salt, or vinegar, or merely by drawing them gently between the fingers, and if then put into clean water, which requires to be repeatedly changed, they gradually recover.

The cases requiring the application of leeches are very numerous, and many of them such as do not easily admit of a substitute; they are employed to relieve local congestion and inflammation, and when used in sufficient numbers, and in the early stage of such morbid actions, they are often eminently useful; as in ophthalmia, some cases of sore throat, in the hoarseness produced by local congestion about the larynx, and in other analogous cases. When applied to children, the bleeding should be carefully and effectively checked, and they should be cautiously used in consequence of the great depression which sometimes attends the loss of a relatively small quantity of blood.

HORDEUM. *Semina integumentis nudata.* The *decorticated seed* of the *Hordeum distichon. Cl.* 3. *Ord.* 2. Triandria Digynia. *Nat. Ord.* Gramineæ.

The native country of barley has not been accurately ascertained. It is cultivated over the whole of Europe, and there are several species, but the above is that which is usually grown in this country. It has a long spike with a double row of male florets on each flat side, and a single row of fertile flowers on each edge. The valves of the calyx are linear, and one half shorter than the corolla, which terminates in a straight serrated awn. When ripe, the husk is coriaceous and angular, and adheres to the grain, which is ovate and grooved. It is decorticated by a machine, which slightly rounds the grain; hence the term *pearl barley.* Barley contains about 90 per cent. of nutritive matter, which is chiefly of the character of starch, with a little gluten, gum, and sugar. When boiled or infused in water, it yields a useful beverage for the table of the invalid, and when mixed with milk, is often used in the diet of infants, but great attention should always be paid to its cleanliness and freshness, for if in the least acescent, it is apt seriously to derange children's bowels, and if too thick, and passed, as it often is, through a dirty strainer, it is quite unfit for the fastidious palate of the valetudinarian.

The Pharmacopœia gives us the two following recipes for *barley water;* they are good vehicles for the alkalis in cases of lithic diathesis, and for various demulcents, also for acids, borax, nitre, and similar applications in the form of *gargle.* They are, however, both of them subjects of culinary, rather than of pharmaceutical art; I may, therefore, refer to the following remarks upon them by the late ingenious author of the "*Cook's Oracle*," whose laudable attempt at the introduction of weight and measure into the art of cookery, deserves more patronage than it has hitherto received.

"These drinks," he observes, "are intended to assuage thirst in ardent fevers and inflammatory disorders, for which plenty of mild diluting liquor is one of the principal remedies; and if not suggested by the medical attendant, is frequently demanded by honest instinct, in terms too plain to be misunderstood. The stomach sympathises with every fibre of the human frame, and no part of it can be distressed without in some degree offending the stomach: therefore it is of the utmost importance to soothe this grand organ, by rendering everything we offer to it as elegant and agreeable as the nature of the case will admit of. The barley drink, prepared according to the second receipt, will be received with pleasure by the most delicate palate."

DECOCTUM HORDEI.	DECOCTION OF BARLEY.
℞ Hordei, uncias duas cum semisse,	Take of Pearl Barley, two ounces and a half,
Aquæ, octarios quatuor cum semisse;	Water, four pints and a half;
Res alienas hordei seminibus adhærentes aquâ primùm ablue; deindè, affuso aquæ octario dimidio, semina paulisper coque. Hâc aquâ abjectâ, superinfunde quod reliquum est, priùs fervefactum; tum decoque ad octarios duos, et cola.	First wash away with water the foreign matters adhering to the barley, then, having poured upon it half a pint of water, boil a little while. Having thrown away this water, pour upon it the remainder, previously made boiling hot; then boil down to two pints, and strain.

DECOCTUM HORDEI COMPOSITUM.	COMPOUND DECOCTION OF BARLEY.
℞ Decocti Hordei, octarios duos,	Take of Decoction of Barley, two pints,
Ficorum concisorum, uncias duas cum semisse,	Figs, sliced, two ounces and a half,
Glycyrrhizæ concisæ et contusæ, drachmas quinque,	Liquorice Root, sliced and bruised, five drachms,
Uvæ, uncias duas cum semisse,	Raisins, two ounces and a half,
Aquæ, octarium;	Water, a pint;
Decoque ad octarios duos, et cola.	Boil down to two pints, and strain.

HUMULUS, *see* LUPULUS.

HYDRACIDS. A class of acids resulting from the combination of *hydrogen* with certain simple bodies, such as with chlorine, iodine, bromine, fluorine, sulphur, &c., forming the hydrochloric, hydrobromic, hydriodic, hydrofluoric, and hydrosulphuric acids; or, with compound bases, such as with cyanogen, forming the hydrocyanic acid, &c. In these acids, one atom of hydrogen is combined with one atom of the other elements, or, what amounts to the same thing, with an equal volume. Of these acids, the most important in reference to their medical uses are the *hydrochloric* and the *hydrocyanic*.

HYDRARGYRUM (*υδραργυρος*, from *υδωρ*, *water*, and *αργυρος*, *silver*). Quicksilver. Mercury.

This is a brilliant white metal, liquid at common temperatures, but solid and malleable at −40°. It boils at a temperature of 670°. Its specific gravity at 60° is 13·5; in the frozen state its specific gravity is 15·6. Its equivalent number, or atomic weight, is 200. The principal ore of mercury is the *sulphuret*, or native *cinnabar;* the metal is procured by distilling it with quicklime or iron, or with a mixture of the two; it is also found in metallic globules disseminated in the sulphuret; and in the form of a *chloride*, or *native calomel*, but the latter is rare. The principal mines of mercury are those of Idria, Carinthia, and the Palatinate; of Almaden, near Cordova, in Spain; and of Guanca Velica, near Potosi, in Peru. It is chiefly imported into this country in iron bottles, each containing from sixty to a hundred pounds weight; that from Austria was formerly contained in leather bags of thirty-one pounds each, two or three of which were packed in each cask. The former Pharmacopœiæ contained directions for purifying mercury by redistilling it, but this precaution was very rarely necessary, and has been superseded by the following *Note*, describing its characters when pure, and the tests by which any impurities or adulterations may be detected.

NOTA.	NOTE.
HYDRARGYRUM (*purificatum*). Calore totum in vapores abit. Idem acido nitrico diluto liquatur, in acido hydrochlorico fervente non item. Hoc ubi refrixerit acido hydrosulphurico immisso, nihil demittit, nec coloratur. Hujus pondus specificum est 13·5.	MERCURY (*purified*). It is entirely dissipated in vapour by heat. It is also dissolved by diluted nitric acid, but not so by boiling hydrochloric acid. The latter, when it has cooled, affords no precipitate by the addition of hydrosulphuric acid; nor is it coloured. Its specific gravity is 13·5.

If the mercury contained other metals, they would resist evaporation: if tin were present, it would not be permanently dissolved by nitric acid, but the tin would be converted into an insoluble peroxide; the absence of lead, bismuth, and most other metals, is indicated by hydrosulphuric acid not discolouring hydrochloric acid after it has been boiled upon the mercury. There is, however, no better indication of the purity of mercury, than its brilliancy and perfect fluidity; for, when it contains lead, tin, or bismuth, even in very minute quantities, it drags a tail and soon tarnishes. When, as is often the case, mercury is dirty and dusty, it may be cleansed by pouring it into a funnel and suffering it gradually to run out through the tube, which should be partially closed by the finger; the foreign matters collect upon the surface, and may be retained in the funnel. Or the mercury may be pressed through a piece of fine linen or flannel.

The chemical equivalent, or atomic weight, of mercury (upon the hydrogen scale), is 200. It forms two salifiable oxides.

So long as mercury remains in the metallic state, it exerts no action upon the system, and when administered in its usual fluid form, and in large quantities, it generally passes off by the bowels, and produces no further effects than those resulting from its weight. It was at one time not unfrequently administered in cases of obstinate constipation, in doses of a pound or more, in the hope of forcing a passage. If the intestinal canal were a straight tube, such a plan might possibly succeed; but when we consider the contortions and windings, the ascents as well as the descents of the passage, its absurdity is evident. Mercury was also formerly celebrated as an alterative, and was used in Charles II.'s reign in small doses to beautify the complexion, remove freckles, and perform the usual functions of cosmetics. It is said, that in those days the sweepings of the drawing-room were among the servants' perquisites, and that no inconsiderable quantity of second-hand mercury was thus collected.

But, if mercury remain for a long time in the stomach and bowels, or if it be very finely divided, it then becomes active, apparently in consequence of its being absorbed in that form into the system, or of its oxydizement; and there are cases in which violent salivation has ensued from a large dose of the metal, in consequence, apparently, of its meeting with something which has oxydized or dissolved it. Mercurial vapour, too, when absorbed either by the lungs or skin, is actively poisonous, as will appear from the toxicological history of mercury and its compounds.

Much discussion and difference of opinion has existed respecting the *modus operandi* of mercury. There seems to be little doubt that it is susceptible of absorption into the blood, and that it is in that way carried into the secretions, and occasionally deposited in the textures of the body. It is even said to have been actually detected in the blood, saliva, bile, and urine; and even in the substance of the brain, bones, lungs, &c.; the authorities upon which these statements are made, are to be found in Dr. Christison's work on poisons; it must, however, be admitted, that the evidence is not quite satisfactory.

The *medical properties and uses* of mercurials are referable to a peculiar stimulant power, the effects of which vary with the nature, quantity, and mode of exhibition of the preparation which is selected, and with the *adjuncts*, or remedies with which it is conjoined. Its pharmacological history, therefore, is somewhat complicated, and the cases in which it is useful, not less varied than numerous.

Mercurials act as stimulants upon the secretory organs, and especially upon the liver and intestines, upon the salivary glands, and the kidneys; but the extent of this action is extremely variable in different constitutions and habits, and of course materially dependant upon the dose which is administered, and the frequency and extent of its repetition. They also exert a peculiar stimulant power over the absorbent system, diminishing dropsical accumulations, and removing glandular indurations. Where they act as purgatives, a great part of their effect seems to be referable to increased secretion of bile, and they certainly have a distinct stimulating action upon the liver; they are often powerful diuretics, but in this respect their chief value is in combination with vegetable remedies belonging to that class. As sialagogues, the mercurials are pre-eminent, and in the numerous cases in which they are administered, it is necessary to pay the minutest attention to their effects upon the mouth and its secretions. They consist, first, in a peculiar taste, in increased moisture, and in a slight redness and tumefaction of the gums; the flow of saliva is then manifestly augmented, the salivary glands become tender, and afterwards swollen, and the odour of the breath disagreeable. By due attention to the quantity and quality of the mercurial employed, and to the management of the patient as to air, clothing, warmth, and diet, these symptoms may be kept up to a moderate extent, and become a valuable test of the constitutional affection; otherwise they go on to produce pain and tumefaction of the gums, tongue, and parts adjacent, difficulty of swallowing, a peculiar fœtor of the mouth, and a flow of saliva to such an extent as to amount in some cases to several pints in the course of the day; this is attended by debility and emaciation, and if the mercury be further persevered in, the mouth becomes ulcerated, and the teeth loosen, and alarming symptoms, indicating a peculiar affection of the nervous system, ensue. These effects are also often associated with diarrhœa, nausea and vomiting, perspiration, and increased flow of urine. They obviously constitute a peculiar diseased state of the system, induced by mercury. This remedy, however, in modern practice, is never pushed to such an extent as intentionally to bring on the latter symptoms; when the mouth is to a certain extent affected, and the flow of saliva moderately increased, all the curative indications of a mercurial course are usually safely and effectively attained, and it is only in neglected cases, or in peculiar states of constitution, or of idiosyncracy, that the effects of excessive ptyalism are witnessed. There are many diseases in the treatment of which mercurial stimulation forms an essential feature, the extent to which it is to be carried depending upon a number of causes, some of which will be noticed under the history of the individual preparations of mercury.

Independent, however, of ptyalism, and of those other effects of mercury just mentioned, there are others which may require special notice and treatment. One of these is a vesicular eruption, which has been termed *erythema*, and *eczema mercuriale:* it consists in a copious eruption of minute vesicles, giving a sensation of roughness to the parts, and generally terminating in desquamation. It is usually attended by fever, cough, and some difficulty of breathing; and has terminated fatally. In the worst cases, a copious discharge ensues, and the epidermis, together with the hair and nails, fall off.

In certain habits, or where mercury is incautiously used, a particular dysenteric affection, attended by distressing tenesmus, a feeble quick pulse, and symptoms of typhoid fever, ensue, attended by intestinal ulceration; there are some constitutions that scarcely bear mercury in any form; as soon as ptyalism commences, great depression of strength and spirits ensues, attended by irregular pulse, and fainting; these symptoms are sometimes followed by a kind of ague, in which the cold fit predominates in some instances, and which in others assumes the character of an inflammatory remittent, but the pulse remains small and quick; the stomach and bowels are disordered; the countenance fallen; there is disinclination to exertion, and in this state the patient has almost suddenly expired.

Much mischief is occasionally done by the incautious use of mercury in cases which are not venereal; and instances are on record in which ulcerated sore throat, eruptive disorders, and osseous or ligamentous tumours, have not only been greatly aggravated by mercury, but in which salivation has been pushed to such an injurious extent as permanently to ruin the already debilitated constitution. Among the lower order of persons, who consult empirics and use their remedies, such cases are not unfrequent; and when we recollect the analogies that sometimes subsist between the mercurial and the venereal disease, we shall not be surprised at the occasional occurrence of doubtful and difficult cases in regular practice. The term *pseudo-syphilis* has sometimes been applied to the mixed cases of venereal and mercurial disease.

We may now proceed to examine the preparations of mercury in most general use, and such as are contained in the *London Pharmacopœia.*

HYDRARGYRUM CUM CRETA.	MERCURY WITH CHALK.
℞ Hydrargyri, uncias tres, Cretæ preparatæ, uncias quinque; Tere simul, donec globuli non ampliùs conspiciantur.	Take of Mercury, three ounces, Prepared Chalk, five ounces; Rub them together till the globules are no longer visible.
NOTA.	NOTE.
HYDRARGYRUM CUM CRETA. Calore pars in vapores abit; quod restat coloris expers est et in acido acetico cum effervescentiâ liquatur. Hic liquor, acido hydrosulphurico immisso, non coloratur. Vix autem tam diligentèr hæc conteri possunt, ut globuli nulli ampliùs conspiciantur.	MERCURY WITH CHALK. Part escapes in vapour by heat; what remains is colourless, and is dissolved-by acetic acid with effervescence. This solution is not coloured by the addition of hydrosulphuric acid. These substances, however, can scarcely be so diligently rubbed together that no globules shall be visible.

When this preparation, which is in the form of a gray powder, is heated, the mercury evaporates, and pure chalk remains, which is of course colourless, and soluble, with effervescence, in acetic acid. If any other metal than mercury were present, it would either remain undissolved by acetic acid, or, if dissolved, the solution would be discoloured by the test of sulphuretted hydrogen.

The addition of a little water considerably accelerates the comminution of mercury, a very small portion of which (if any?) is converted into *protoxide* during the trituration.

Different opinions are entertained respecting this mercurial; some maintain that it is inert, and others consider it as an effective though mild remedy. There are cases in which *very small doses* of mercury are productive of good effect, and such are suited to this preparation, which may be taken in doses of from five grains up to twenty or thirty. The beneficial effect of very minute doses of mercury, where the usual mode of administering it produces bad consequences, as is frequently the case in those forms of dyspepsia which are attended by disordered bilious secretion, has been well pointed out by Dr. Wilson Philip (*Treatise on Indigestion*). As far as respects the remedy we are now considering, it is certainly, in equivalent doses, less active than the *Pilula Hydrargyri*, and its activity seems to be more dependant upon the state of the secretions of the stomach and bowels. It is much esteemed by some judicious practitioners as correcting the biliary secretion in children, and especially as increasing it when the stools are clay-coloured or pale. The extreme mildness of this mercurial, generally requires that its use should be continued for some time, but the good effects which result are often more permanent than when larger doses are employed; and not unfrequently the latter fail, while the former succeed in restoring healthy action.

In tabes and atrophia of children, and in some of their cutaneous affections, this mercurial has been preferred as an alterative; in these cases the varying susceptibility of different constitutions to the effects of mercury must not be lost sight of; and when the gums become in the least affected, it should be suspended, or the dose duly diminished.

Pilulæ Hydrargyri.	Pills of Mercury.
℞ Hydrargyri, drachmas duas,	Take of Mercury, two drachms,
Confectionis Rosæ Gallicæ, drachmas tres,	Confection of Red Rose, three drachms,
Glycyrrhizæ contritæ, drachmam;	Liquorice, powdered, a drachm;
Hydrargyrum cum confectione tere, donec globuli non ampliùs conspici possint; deinde, adjectâ glycyrrhizâ, omnia simul contunde, donec corpus unum sit.	Rub the mercury with the confection till globules can no longer be perceived, then, having added the liquorice, pound all together till incorporated.

In the wholesale manufacture of this preparation, commonly known under the name of *blue pill*, substances are occasionally added to accelerate the incorporation of the mercury; but these additions are prejudicial, and tend to render the operation of the medicine uncertain. At Apothecaries' Hall, a machine impelled by the steam-engine is employed for triturating the ingredients, consisting of a circular iron trough, in which revolve four wooden cylinders, having also a motion on their axes; in this way the admixture of the mercury is perfectly and unexceptionably effected.

Mercurial pill, when properly prepared, is of a good consistence for the formation of pills, and when rubbed upon paper, should not exhibit visible mercurial globules; it is supposed to become more active by keeping. It is an excellent, and at the same time mild, mercurial, calculated to fulfil most of the intentions with which the metal is exhibited. It is probable that the mercury in this pill is only in a state of extreme mechanical division, and of intimate mixture with the inert ingredients; we have at all events no direct evidence that in this and other analogous mercurials, any actual oxidizement of the metal has been effected, and it is probable that they derive their activity from the extremely comminuted state of the mercury, which, being a fluid metal, is peculiarly susceptible of infinite division. I am not aware that any experiments have been made to ascertain the medical effects of mercurial amalgams, but they might possibly throw some light upon the *modus operandi* of this class of formulæ.

Mercurial pill when given as an alterative, is used in doses of from one or two to four or five grains, two or three times a day. When intended as a purgative, from ten to twenty grains may be administered; but it generally requires the aid of a little extract of colocynth, or some similar adjunct: or a mercurial pill of five or six grains may be taken at bed-time, and a draught of infusion of senna and sulphate of magnesia early the following morning. It is also used in the cure of syphilis and other disorders requiring salivation; to this intent, a pill of five grains may be taken thrice a day; or five grains in the morning and ten grains at night; and as this dose is apt to act upon the bowels, it commonly requires to be combined, especially at night, with an adequate dose of opium.

There are many cases of torpidity of the bowels connected with hypochondria, with impaired digestion, loss of appetite, lassitude, drowsiness, and general inactivity of the system, in which, apparently as an hepatic stimulant, small doses of blue pill are extremely effective, especially conjoined with rhubarb or with aloes, as in the two following formulæ:—

℞ Pilulæ Hydrargyri,
Extracti Rhæi, āā ʒj.
Misce optime et divide in pilulas xxx. Sumatur una bis die.

℞ Pilulæ Hydrargyri, ʒj.
Aloes pulveris, ʒss.
Divide in pilulas xxiv. quarum sumantur duæ omni nocte.

HYDRARGYRI OXYDUM.	OXIDE OF MERCURY.
℞ Hydrargyri Chloridi, unciam, Liquoris Calcis, congium; Misce et sæpius agita. Sepone, et ubi subsederit oxydum, liquorem effunde. Denique in aquâ destillatâ lava donec alkalini nihil percipi possit, et chartâ bibulâ involutum in aëre exsicca.	Take of Chloride of Mercury, an ounce, Lime-water, a gallon; Mix and frequently shake them; set aside, and when the oxide has subsided, pour off the liquor. Lastly, wash it in distilled water until nothing alkaline can be perceived, and dry it in the air, wrapped in bibulous paper.
NOTA.	NOTE.
HYDRARGYRI OXYDUM (*cinereum*). Paulispèr cum acido hydrochlorico digestum et colatum nihil indè, vel liquore potassæ, vel ammoniæ oxalate adjecto, demittit. In acido acetico omne liquatur. Calore in vapores totum abit.	OXIDE OF MERCURY (*gray*). Digested for a short time with hydrochloric acid and filtered, nothing is precipitated by the addition of solution of potassa or of oxalate of ammonia. It is entirely soluble in acetic acid. By heat it is totally evaporated.

When the above oxide is pure, diluted hydrochloric acid converts it into protochloride of mercury, or calomel, which is insoluble in that acid. If, on the other hand, it contain any of the binoxide or red oxide of mercury, it will be dissolved by the acid, and will be thrown down in the form of an orange-coloured precipitate, by solution of potassa. The presence of lime, or carbonate of lime, in the oxide, is indicated by a white precipitate when oxalate of ammonia is added to the hydrochloric solution. If undecomposed protochloride of mercury be present, it remains insoluble in acetic acid; and other impurities are indicated by their want of volatility. The theory of the decomposition of calomel by lime-water (affording the *black lotion* of surgery), is stated under the article *Chloride of Mercury*. The above oxide consists of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	96·2
Oxygen	1	8	3·8
Protoxide of Mercury	1	208	100·0

The protoxide of mercury is scarcely ever used internally; the *Hydrargyrum cum Cretâ*, and the *Pilulæ Hydrargyri*, may in all cases be substituted for it. It is liable to be decomposed by exposure to light, and the evil of this decomposition is, that metallic mercury and *peroxide* appear to result; and as the latter is a virulent mercurial, the above oxide is, so far, highly objectionable. Mr. Abernethy employed the protoxide of mercury as a source of mercurial vapour for fumigation, and states that, when properly applied, it has excited salivation in the course of forty-eight hours: his directions for its use are as follow: place the patient in a vapour-bath in a suit of under-garments, with a cloth round the chin; then put two drachms of the oxide upon a heated iron within the machine in which the patient is seated. After continuing in the bath for fifteen or twenty minutes, the body is found covered with a whitish powder; the patient should then be put to bed, and remain in the same clothes till morning, and then use a tepid bath.

Mr. Donovan has proposed to use this oxide for the preparation of a mercurial ointment, as a substitute for the *Unguentum Hydrargyri.*

Hydrargyri Binoxydum.	Binoxide of Mercury.
℞ Hydrargyri Bichloridi, uncias quatuor, Liquoris Potassæ, fluiduncias viginti octo, Aquæ destillatæ, octarios sex; Hydrargyri bichloridum in aquâ liqua: cola, et adjice liquorem potassæ. Pulverem demissum, effuso liquore, in aquâ destillatâ lava, donec alkalini nihil percipi possit, et leni calore exsicca.	Take of Bichloride of Mercury, four ounces, Solution of Potassa, twenty-eight fluid ounces, Distilled Water, six pints; Dissolve the bichloride of mercury in the water; filter, and add the solution of potassa. Having poured off the liquor, wash the precipitated powder in distilled water till nothing alkaline can be perceived, and dry it by a gentle heat.
Nota.	Note.
Hydrargyri Binoxydum (*rubrum*). Admoto calore oxygenium emittit, et hydrargyrum vel in globulos coit, vel in vapores totum abit. Acido hydrochlorico omne liquatur.	Binoxide of Mercury (*red*). By the action of heat it emits oxygen, and the mercury either unites into globules, or entirely evaporates. It is wholly soluble in hydrochloric acid.

To this *Note* Mr. Phillips adds the following *Remarks:* "When it is dissolved in nitric acid no precipitate is yielded by nitrate of silver; or if there should be any, either it has not been sufficiently washed, or the bichloride of mercury has been imperfectly decomposed and consequently precipitates the silver of the nitrate of silver as a chloride."

The theory of the above process will be found under the article *Bichloride of Mercury;* it is an objectionable mode of preparing the binoxide, if intended for internal use, and an unnecessary one, if merely for its external employment. This oxide was formerly obtained by exposing mercury in a long-necked mattrass to the action of heat, when it gradually becomes converted into a red crystalline oxide, which assumes a bright red colour when finely powdered, and when heated becomes nearly black, but regains its former hue as it cools. It has a slightly-metallic taste, and is very sparingly soluble in water: it consists of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	92·12
Oxygen	2	16	7·88
Binoxide of Mercury	1	216	100·00

This oxide is not calculated to fulfil any indication which cannot be attained by other mercurials, and is liable to act virulently upon the stomach and bowels, sometimes in doses of a single grain.

As an escharotic and stimulant application to sores, it is sometimes employed, as being milder in effect than the nitrico-oxide, and in the same way. For these purposes it should be reduced to the finest state of powder, and either sprinkled in substance upon the diseased surface, or applied in the form of ointment, or diffused through water thickened with a little mucilage of gum arabic.

HYDRARGYRI NITRICO-OXYDUM.

℞ Hydrargyri, libras tres,
Acidi Nitrici, libram cum semisse,
Aquæ destillatæ, octarios duos;

Misce in vase idoneo, et lenem calorem adhibe, donec liquetur hydrargyrum. Liquorem decoque; et quod restat tere in pulverem. Hunc in vas aliud quam minimè profundum conjice; tum ignem lenem adhibe, eumque paulatim auge, donec vapor ruber prodire cessaverit.

NOTA.

HYDRARGYRI NITRICO-OXYDUM. Admoto calore, vapores nitricos nullos emittit. Nihil ex aquâ, in quâ coctum seu lotum fuerit, liquore calcis aut acido hydrosulphurico adjecto, demittitur. Cætera superiori respondent.

NITRIC OXIDE OF MERCURY.

Take of Mercury, three pounds,
Nitric Acid, a pound and a half,
Distilled Water, two pints;

Mix them in a proper vessel, and apply a gentle heat till the mercury is dissolved. Boil down the solution, and rub what remains into powder. Put this into a shallow vessel; then apply a gentle heat, and gradually increase it till red vapour ceases to escape.

NOTE.

NITRIC OXIDE OF MERCURY. On the application of heat it emits no nitric vapours. Neither lime-water, nor hydrosulphuric acid, being added, throw down anything from water in which it has been boiled or washed. In other respects it resembles the preceding (Hydrargyri binoxidum).

If nitric vapour arise on heating this preparation, it indicates the presence of nitric acid, which should have been previously expelled: if nitrate of mercury is present, it is precipitated by lime-water or by hydrosulphuric acid from the water in which the nitric oxide has been boiled.

In the first part of the above process a pernitrate of mercury is formed, which is then decomposed by heat; but it is difficult so to apply the heat, as to expel the whole of the acid, without at the same time evolving oxygen from the remaining oxide and evaporating part of the mercury. We find, therefore, a small portion of nitric acid generally remaining in the compound. The nitrate requires to be constantly stirred during the process, which is usually performed in a cast-iron pot; the operator will find it advantageous to prepare the solution and partly to evaporate it in a retort with an annexed receiver containing a little water, by which, if any quantity of materials be employed, he will save a part of the acid. Water which has been boiled upon it is always discoloured by hydrosulphuric acid.

Nitrico-oxide of mercury is of a brilliant red colour, with a shade of orange; when not in very fine powder it has a glistening scaly appearance; at a red heat it is decomposed and entirely dissipated, provided it be not adulterated, as it sometimes is, with red-lead; it has an acrid taste, is very sparingly soluble in water, and readily soluble, without effervescence, in nitric acid. The proportion of subpernitrate of mercury remaining in this preparation is variable; but some is always to be detected, for when decomposed by heat, the evolved oxygen is found to be mixed with a portion of nitrogen; it therefore should not be used as a substitute for pure peroxide of mercury. When washed with and triturated in a dilute solution of potassa, edulcorated with distilled water, and carefully dried, it may be regarded as a nearly pure peroxide of mercury. In this state it is called *Arcanum Corallinum* in some of the older Pharmacopœiæ.

Nitrico-oxide of mercury is only employed as an external application, either alone, finely levigated, or mixed with ointment. Sprinkled upon the surface of old or indolent sores, it not unfrequently stimulates them to more healthy action; sometimes it irritates, and may then be diluted with two or three parts of starch, or other inert matter. It is sometimes used as an escharotic mixed with powdered savine, burnt alum, and various stimulants; and mixed with eight or ten parts of finely-powdered sugar, is one of the remedies which some oculists direct to be blown upon the eye for the removal of specks in the cornea.

UNGUENTUM HYDRARGYRI NITRICO-OXYDI.	OINTMENT OF NITRIC OXIDE OF MERCURY.
℞ Hydrargyri Nitrico-Oxydi, unciam,	Take of Nitric Oxide of Mercury, an ounce,
Ceræ albæ, uncias duas,	White Wax, two ounces,
Adipis, uncias sex;	Lard, six ounces;
Ceræ et adipi, simul liquefactis, adjice hydrargyri nitrico-oxydum in pulverem subtilissimum tritum, et misce.	To the wax and lard melted together add the nitrico-oxide of mercury, rubbed into a very fine powder, and mix.

This ointment is a stimulant, and, independent of its application to indolent ulcers and excoriations, is of use in conjunctival inflammation and opacity of the cornea. The utmost attention should be paid to the levigation of the nitrico-oxide. It is generally applied upon a piece of lint, of the size of the sore, covered by another piece spread with spermaceti ointment.

HYDRARGYRI CHLORIDUM.	CHLORIDE OF MERCURY.
℞ Hydrargyri, libras quatuor,	Take of Mercury, four pounds,
Acidi Sulphurici, libras tres,	Sulphuric Acid, three pounds,
Sodii Chloridi, libram cum semisse,	Chloride of Sodium, a pound and a half,
Aquæ destillatæ, quantum satis sit;	Distilled Water, as much as may be sufficient;
Hydrargyri libras duas cum acido sulphurico in vase idoneo coque, donec hydrargyri bipersulphas sicca restet; hanc ubi refrixerit cum hydrargyri	Boil two pounds of the mercury with the sulphuric acid, in a proper vessel, till dry bipersulphate of mercury remains; when this is cold rub it in an earthenware

libris duabus, in mortario fictili contere ut optimè misceantur. Dein sodii chloridum adjice, et simul tere, donec globuli non amplius conspiciantur; tum sublima. Sublimatum in pulverem subtilissimum contere et aquâ destillatâ fervente diligenter lava et exsicca.	mortar with two pounds of mercury, so that they may be well mixed. Then add the chloride of sodium, and rub them together till globules can no longer be discerned; then sublime. Rub the sublimate into a very fine powder, and wash it thoroughly with boiling distilled water, and dry it.
NOTA.	NOTE.
HYDRARGYRI CHLORIDUM. Pulvis subalbus, qui potassâ adjectâ, nigrescit, et calore adhibito, in hydrargyri globulos coit. Idem calore in vapores totus abit. Adjectâ argenti nitrate, aut liquore calcis, aut acido hydrosulphurico, nihil demittitur ex aquâ destillatâ in quâ seu lotum seu coctum sit.	CHLORIDE OF MERCURY. A whitish powder, which, on the addition of potassa, blackens, and heat being applied runs into globules of mercury. It is also entirely vaporised by heat. On the addition of nitrate of silver, or lime-water, or hydrosulphuric acid, to water in which it (the chloride of mercury), has been either washed or boiled, nothing is thrown down.

When chloride of mercury is decomposed by potassa, chloride of potassium and protoxide of mercury are the results; the latter is blackish, and when heated, evolves oxygen, and is reduced to the metallic state. When pure, chloride of mercury is entirely volatilised by heat, and is perfectly insoluble in boiling water; so that if the above-mentioned tests afford any precipitate or even discoloration in water that has been boiled upon it, and afterwards carefully filtered off, the presence of bichloride of mercury, or other impurities, is indicated; the nitrate of silver would in that case throw down a white precipitate of chloride of silver; the lime-water would produce a yellowish precipitate, and the hydrosulphuric acid a black one.

The term *Hydrargyri Chloridum* is now substituted for the improper one of *Hydrargyri Submurias*, which was formerly applied to this compound, so well known under the name of *Calomel.* It is a protochloride of mercury, and consists of—

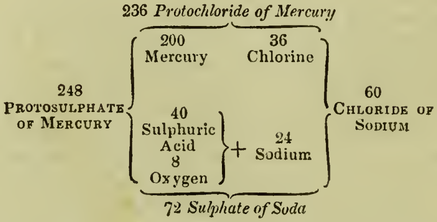
	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	84·6
Chlorine	1	36	15·4
Protochloride of Mercury	1	236	100·0

In the process for its preparation, a *persulphate of mercury* (that is, a sulphate of the peroxide of mercury, composed of 2 atoms of sulphuric acid and 1 atom of peroxide of mercury) is first formed by boiling two pounds of the metal with three pounds of sulphuric acid, to dryness. This process may be performed in the large way, in a cast-iron vessel, which should be properly arranged for the escape of the sulphurous acid developed by the action of the mercury, and which may be got rid of by suffering it to pass through a long flue and lofty chimney, mixed with abundance of coal smoke. The *persulphate* of mercury is then triturated with a sufficient quantity of metallic mercury to convert it into a *protosulphate*, and lastly mixed with a due proportion of common salt, and subjected to sublimation.

Protosulphate of mercury is a compound of—

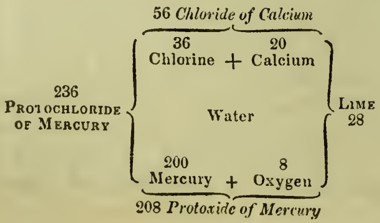
	Atoms.	Equivalents.	Per Cent.
Protoxide of Mercury . .	1 . .	208 . .	83·8
Sulphuric Acid	1 . .	40 . .	16·2
Protosulphate of Mercury .	1 . .	248 . .	100·0

For the conversion of this protosulphate into protochloride, 1 atom or equivalent of chloride of sodium is required, as shown in the following diagram:—



So that 248 parts of protosulphate of mercury and 60 of chloride of sodium, are converted by mutual decomposition into 236 of protochloride of mercury and 72 of sulphate of soda.

The directions in the Pharmacopœia for the sublimation, levigation, and washing of calomel are insufficient, but this is not a matter of much importance, as it is only made by the wholesale chemist or manufacturer, and, when procured from a respectable source, is always pure and well prepared. It varies considerably in appearance with the temperature at which it is sublimed, and the rapidity with which its vapour is condensed. If slowly sublimed into a small condenser, it is often in the form of a corneous mass, or fibrous crystalline cake, which, when scratched, exhibits a peculiar buff-coloured streak, and its surface frequently is covered with brilliant prismatic crystals. When it is rapidly condensed in a capacious receiver, it is in the form of a white powder. Calomel should be perfectly tasteless, inodorous, and insoluble in water. Its specific gravity is about 7·2. At a heat somewhat below redness, it rises in vapour, and fuses when subjected to a higher heat and pressure. When rubbed in the dark, it is phosphorescent. It is decomposed by the fixed alkalis, and by ammonia, and protoxide of mercury is one of the results. When thus decomposed by *lime-water*, it yields, as above stated (page 275), a black oxide, and the mixture is often employed under the name of *black wash*, as an application to venereal and other sores: the theory of this decomposition is shown in the annexed diagram:—



It is generally stated that calomel is discoloured by long exposure to light, but I have kept it hermetically sealed in a glass tube, without undergoing any such change, so that the contact of air or its impurities is probably concerned in its change of hue.

Beguin, in 1608, is the first European author who describes calomel; he calls it *draco mitigatus;* corrosive sublimate having been known to the alchymists under the name of "the dragon." It appears, however, from Mr. Hatchett's experiments and observations on the calomel of Thibet, published in *Nicholson's Journal* for June, 1803, that this substance had long been known to, and prepared by, the natives of that part of India. Among other names given to calomel by the older pharmaceutical chemists, are *aquila alba*, *panchymagogum minerale*, *panacea mercurialis*, *manna metallorum*, and *sublimatum dulce.* It was once customary to give it various names according as it had been more or less frequently sublimed, but it is now known that these repeated sublimations, so far from dulcifying, as was supposed, the product, tend rather to the decomposition of a part of it, and to the formation of perchloride of mercury.

Much difference of opinion exists respecting the etymology of the word *calomel*, or *calomelas*, a name which is stated to have been conferred upon it by Sir Theodore Mayerne, and to be derived from καλος, and μελας, *white*, and *black*, perhaps because a white sublimate is obtained from a black powder; for the old method of preparing it consisted in triturating corrosive sublimate with metallic mercury, till the mixture was reduced to the state of an uniform dark-gray powder, which, by sublimation, yielded calomel. Others say that Sir Theodore named it in honour of his favourite black servant; and others, that it was called calomel as being a *good* remedy for *black* bile.

Chloride of mercury, or *calomel*, is sometimes used as an antisyphilitic, more especially combined with opium, when it salivates without purging. Its chief use, however, is as a purge, conjoined with other aperients, and as an alterative: for the former purpose it is administered in doses of three to six grains, with senna, cathartic extract, scammony, rhubarb, or other laxatives. The most customary form is four or five grains of calomel, in a pill, at night; and a draught of infusion and tincture of senna, with some saline aperient, early in the morning: for this purpose the common *black dose* is an effective prescription, of which the following is one of the usual forms:—

℞ Magnesiæ Sulphatis, ℥iij.
Infus. Sennæ compos. f℥xiv.
Tincturæ Sennæ, f℥ij.
Olei Menthæ Piper. ♏ij.
M. fiat haustus laxans.

This is generally followed by two or three bilious motions.

Purgative doses of calomel have long been resorted to as anthelmintics, but mercury has no specific action upon intestinal worms, and if effectual, it operates merely as a purge.

As an alterative, calomel is used in chronic hepatitis, and various glandular diseases, and in some cutaneous affections. Combined with diuretics, calomel singularly contributes to their activity; hence its use in dropsies, united with squills and digitalis, or with hydragogue purgatives, such as elaterium and jalap; and when conjoined with antimonials, it determines their diaphoretic action; in these cases calomel acts as a dirigent, the usual dose being from a quarter of a grain to two grains, night and morning, modifying it, and that of the medicines combined with it, according to circumstances. Purgatives, including calomel, are also very effectual in a variety of febrile disorders; and in typhoid fevers, calomel, especially in connexion with antimony, sometimes effects a surprising amelioration of the symptoms, especially when the mouth is slightly affected. In febrile affections of children, symptomatic of a disturbed state of stomach and bowels, purges of calomel and rhubarb are almost always effectual in affording relief; they usually bring away a large quantity of offensive mucus from the bowels; and where this is the case, they should be repeated in intervals of two or three days, till the motions assume a more healthy aspect; but calomel purges are not to be indiscriminately and unnecessarily given to children, as they often are.

In epilepsy, tetanus, and other convulsive disorders, a combination of opium and calomel is an efficacious antispasmodic; and, by some, direct sedative effects have been ascribed to it when given in large doses. In yellow fever, hydrocephalus, and in some cases of croup, four or five grains have been given every two or three hours, till salivary irritation has been induced.

In cutaneous affections, in some forms of venereal eruptions, in chronic rheumatism, a compound of calomel and sulphuret of antimony is sometimes employed, under the name of *Plummer's Pill;* or the following substitute for it, which has a place in the *London Pharmacopœia:*—

Pilulæ Hydrargyri Chloridi Compositæ.	Compound Pills of Chloride of Mercury.
℞ Hydrargyri Chloridi,	Take of Chloride of Mercury,
Antimonii Oxysulphureti, singulorum drachmas duas,	Oxysulphuret of Antimony, of each, two drachmas,
Guaiaci Resinæ contritæ, unciam dimidiam,	Resin of Guaiacum, powdered, half an ounce,
Sacchari Fæcis, drachmas duas;	Treacle, two drachms;
Tere hydrargyri chloridum cum antimonii oxysulphureto, dein cum guaiaci resinâ, et sacchari fæce, ut fiat unum corpus.	Rub the chloride of mercury with the oxysulphuret of antimony, then with the resin of guaiacum, and the treacle, that it may form a mass.

The following are formulæ illustrative of some of the applications of calomel:—

1. Purgative.

℞ Extracti Colocynthidis compos. ʒss.
Pil. Aloes c. Myrrhâ, ʒj.
Hydraryri Chloridi, ʒss.
Misce optime et divide in pilulas xxiv. Sumantur duæ pro dosi.

This is a good form of purging pill, taken at night, and followed up in the morning by an aperient draught. But it often happens that calomel, either alone, or with cathartic extract, produces nauseation and vomiting, either in the course of the night or the following morning, an effect which is almost always prevented by the addition of a little opium; in such cases the following pills must be substituted for the above:—

℞ Hydrargyri Chloridi, gr. iij.
Opii crudi, gr. j.
Caryophilli pulver. gr. iij.
Misce et divide in pilul. ij. hora somni sumendus.

℞ Hydrargyri Chloridi, grana x.
Scammon. pulver.
Jalap. pulv. āā ℈j.
Sacchari albi, ℈ij.
Misce et divide in partes decem æquales.

The preceding powders are a useful calomel purge for children, each containing one grain of calomel, two of scammony, and two of jalap; this dose may be given in a small teaspoonful of gruel, or in a little raspberry jam.

2. DIURETIC.

℞ Pilul. Scillæ compos. ʒj.
Hydrarg. Chloridi, grana v.
Misce et divide in pilulas xx. quarum sumantur duæ singulis noctibus.

℞ Folior. Digitalis pulver. gr. ss.
Scillæ pulver. gran. j.
Hydrargyr. Chloridi, gr. ss.
Confect. Rosæ Gall. q. s.
Ut fiat pilula semel vel bis die sumenda, superbibendo haustum sequentem.

℞ Potassæ Carbonatis, ℈j.
Succi Limonis, f℥ss.
Misturæ Camphor. f℥j.
Spt. Ætheris Nitrici, fʒj.
Syrupi Zingiberis, fʒss. Misce.

3. DIAPHORETIC.

℞ Hydrargyri Chloridi, gr. ss.
Pulv. Ipecacuanhæ compos. gr. x.
Misce: fiat pulvis hora somni sumendus.

℞ Hydrargyri Chloridi,
Antimonii Potassio-tartratis, āā gran. iij.
Sacchari grana, ʒss.
Misce accuratissime et divide in partes sex æquales, quarum sumatur una hora somni.

These formulæ must be accompanied by other diaphoretic treatment, such as hot water-gruel, or barley-water, taken with them at bed-time; sufficiency of bed-clothes; and occasionally a draught composed of saline diaphoretics, with camphor.

HYDRARGYRI BICHLORIDUM.	BICHLORIDE OF MERCURY.
℞ Hydrargyri, libras duas, Acidi Sulphurici, libras tres, Sodii Chloridi, libram cum semisse;	Take of Mercury, two pounds, Sulphuric Acid, three pounds, Chloride of Sodium, a pound and a half;
Hydrargyrum cum acido sulphurico in vase idoneo decoque, donec hydrargyri bipersulphas sicca restet; hanc, ubi refrixerit, cum sodii chlorido in mortario fictili contere; tum calore sensim aucto, sublima.	Boil the mercury with the sulphuric acid in a proper vessel till dry bipersulphate of mercury remains; when this has cooled, rub it with the chloride of sodium in an earthenware mortar; then sublime by a gradually increased heat.

NOTA.	NOTE.
HYDRARGYRI BICHLORIDUM (*crystallinum*). Calore liquescit et sublime fertur. In aquâ et æthere sulphurico totum liquatur. Ex hoc liquore quod, adjectâ potassâ vel liquore calcis dejicitur, rubescit: vel, si quod satis sit addideris, flavescit. Id calore adhibito, oxygenium emittit et in hydrargyri globulos coit.	BICHLORIDE OF MERCURY (*crystallised*). It fuses, and is sublimed by heat. It is entirely soluble in water, and in sulphuric ether. That which is thrown down from this solution by potassa or lime-water becomes red, or, if a sufficient quantity be added, it is yellow; this, by heat, emits oxygen, and runs into globules of mercury.

If not entirely volatile, some impurity is present; if it contain chloride of mercury, it is not entirely soluble in water. The yellow precipitate thrown down by potassa is hydrated binoxide of mercury, which, when heated in a retort, is resolved into oxygen and metallic mercury, and is totally vaporisible by heat.

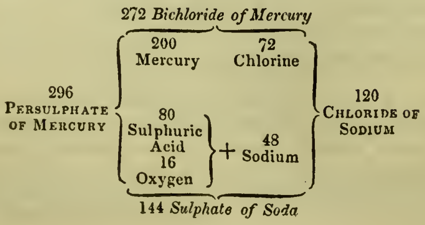
The term *Hydrargyri Bichloridum* is now substituted for *Hydrargyri Oxymurias; Corrosive Sublimate*, or *Mercurius corrosivus Sublimatus*, is perhaps a better pharmaceutical denomination for this compound. It consists of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	73·5
Chlorine	2	72	26·5
Bichloride of Mercury	1	272	100·0

In this, as in the process for the production of calomel, the first step consists in the formation of a persulphate of mercury, by boiling the metal with sulphuric acid. During this operation, part of the acid is decomposed and deoxidised by the mercury, its water is evaporated, sulphurous acid is evolved, and the peroxide of mercury which is formed combines with the remaining anhydrous sulphuric acid to form a dry sulphate of peroxide of mercury, composed of—

	Atoms.	Equivalents.	Per Cent.
Peroxide of Mercury	1	216	73
Sulphuric Acid	2	80	27
Persulphate of Mercury	1	296	100

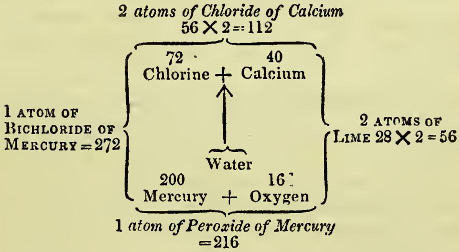
This is then mixed with 2 atoms of chloride of sodium, and on the application of heat in a proper subliming vessel, mutual decomposition ensues, attended by the formation of 1 atom of bichloride of mercury, which rises in vapour, and 2 atoms of sulphate of soda, which is the residue, as shown in the following diagram:—



The persulphate of mercury is generally prepared upon the large scale, by heating the acid and metal in an iron pot, as described in reference to the preparation of chloride of mercury, and similar means may be adopted to carry off the fumes of sulphurous acid arising from the decomposition of a portion of the sulphuric acid, during the peroxidizement of the mercury. The whole is then evaporated to dryness, and the subsequent sublimation performed in glass, earthenware, or iron vessels, their form and arrangement being dependant upon the quantity of materials employed.

Bichloride of mercury has an acrid nauseous taste, leaving a permanent metallic and astringent flavour upon the tongue. Its specific gravity is 5·2. It is usually met with in the form of white semitransparent and imperfectly crystallised masses. It is soluble in twenty parts of water at 60°, and boiling water takes up about one-third its weight: alcohol at 60° dissolves half its weight, and ether about one-third its weight. When heated, it sublimes in the form of a dense white vapour, powerfully affecting the nose and mouth. It dissolves without decomposition in hydrochloric acid, but is insoluble in concentrated nitric and sulphuric acids. Hydrochloric acid of the specific gravity 1·158, at 60° dissolves about its own weight, and the solution, when cooled to about 40°, concretes into a mass of acicular crystals.

When solutions of potassa, soda, or lime, are mixed with solution of bichloride of mercury, a yellow precipitate falls, which is hydrated peroxide of mercury. Such a mixture of eight ounces of lime-water, with half a drachm of the bichloride, was formerly used as an application to venereal ulcers, under the name of *Aqua Phagedænica.* It is, in fact, a solution of chloride of calcium mixed with peroxide of mercury, *two* atoms of lime being required for the decomposition of *one* atom of the bichloride, as shown in the following diagram, which also exhibits the theory of the decomposition:—


2 *atoms of Chloride of Calcium*
56 × 2 = 112
72
Chlorine + Calcium
40
1 ATOM OF BICHLORIDE OF MERCURY = 272
2 ATOMS OF LIME 28 × 2 = 56
Water
200
Mercury + Oxygen
16
1 *atom of Peroxide of Mercury* = 216

When solution of bichloride of mercury is decomposed by ammonia, the result is not peroxide of mercury, but a white precipitate, the *Hydrargyri Ammonio-Chloridum* of the Pharmacopœia. Hydrochlorate of ammonia considerably increases the solubility of the bichloride of mercury, 1 part rendering 5 parts soluble in rather less than 5 of water. Such solutions are occasionally useful for the internal exhibition of this bichloride. Boerhaave's solution had a place in the *Edinburgh Pharmacopœia* of the year 1783; it was as follows:—

℞ Mercurii Sublimati Corrosivi, gr. vj.
Salis Ammoniaci, gr. xij. Solve in
Aquæ destillatæ, libra una.

The solubility of bichloride of mercury is also increased by common salt. A solution composed of 7 parts of salt and 20 of water, dissolves 32 parts of the bichloride; it deposits rhomboidal crystals, probably composed of 1 atom of each of the chlorides.

Bichloride of mercury is decomposed by several of the metals: they generally abstract half the chlorine, and convert it into protochloride.

LIQUOR HYDRARGYRI BICHLORIDI.	SOLUTION OF BICHLORIDE OF MERCURY.
℞ Hydrargyri Bichloridi, Ammoniæ Hydrochloratis, singulorum grana decem, Aquæ destillatæ, octarium; Hydrargyri bichloridum et ammoniæ hydrochloratem simul in aquâ liqua.	Take of Bichloride of Mercury, Hydrochlorate of Ammonia, of each, ten grains, Distilled Water, a pint; Dissolve the bichloride of mercury and the hydrochlorate of ammonia together in the water.

This solution furnishes a convenient means of subdividing bichloride of mercury into small doses for internal use; each fluid ounce contains half a grain, and each fluid drachm one sixteenth of a grain, of the bichloride; the solution is permanent, and not easily changed or decomposed by any of the vehicles in which it is commonly administered.

Bichloride of mercury, or corrosive sublimate, was formerly more employed, as an internal remedy, than at present. If given incautiously, it is apt to bring on dyspeptic symptoms, attended by pains of the stomach, and diarrhœa: these effects are remedied by opium; and such a combination is sometimes employed to excite salivation. Some difference of opinion has, however, arisen as to its antisyphilitic powers, and it is now never exclusively selected for the cure of the venereal disease; but it is frequently an effectual adjunct to other mercurials, in the treatment of the flying pains and cutaneous eruptions which attend some forms of that disease.

The dose, at the commencement, should not exceed from one sixteenth to one eighth of a grain, and it is best administered in solution:—

℞ Liq. Hydr. Bichloridi, fʒj.
Aquæ Pimentæ, f℥j.
Misce fiat haustus bis die sumendus.

To the above, a few drops of the tincture of opium may be added, if the state of the bowels renders it necessary.

In conjunction with cinchona, sarsaparilla, and other vegetable decoctions and infusions, bichloride of mercury is given as an alterative: and though sometimes more or less decomposed in these compounds, it remains an effective mercurial.

Applied externally, bichloride of mercury acts as a powerful stimulant; but its solubility enables it to be used in any state of dilution. It is sometimes employed for the relief of cutaneous eruptions, but is very apt to irritate; dissolved in bitter-almond milk it forms the basis of

Gowland's Lotion, which is probably rendered more bland in its operation, by the presence of vegetable albumen. If used in ointment, care should be taken to ensure its complete division and mixture, by triturating it with its weight of hydrochlorate of ammonia, adding a little water, and then gradually rubbing it up with purified lard or spermaceti ointment.

Corrosive sublimate, with the occasional addition of white arsenic, is effective is the destruction of bugs. The bedsteads should be taken to pieces, and every joint and crevice anointed and brushed over with the following solution or ointment:—

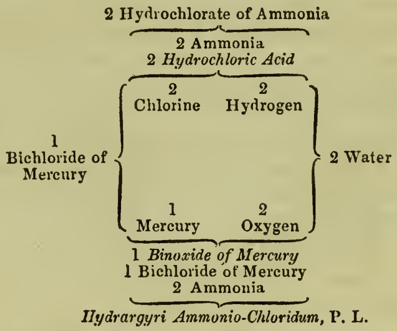
> Dissolve one ounce of Corrosive Sublimate in a pint of rectified Spirit of Wine, and add four ounces of Linseed Oil, and four ounces of Oil of Turpentine.
>
> Reduce one ounce of Corrosive Sublimate and one of White Arsenic to a fine powder; mix it with one ounce of Sal-Ammoniac in powder, two ounces of Oil of Turpentine, two ounces of Yellow Wax, and eight ounces of Olive Oil: put these ingredients into a gallipot placed in a pan of boiling water, and when the wax is liquefied, stir the whole in a mortar till cold.

To prevent accidents, the above compositions should be distinctly labelled—Bug Poison.

Hydrargyri Ammonio-Chloridum.	Ammonio-Chloride of Mercury.
℞ Hydrargyri Bichloridi, uncias sex, Aquæ destillatæ, octarios sex, Liquoris Ammoniæ, fluiduncias octo; Hydrargyri bichloridum, calore adhibito, in aquâ liqua. Huic ubi refrixerit, liquorem ammoniæ adjice, subindè agitans. Pulverem demissum lava, donec saporis expers sit; denique exsicca.	Take of Bichloride of Mercury, six ounces, Distilled Water, six pints, Solution of Ammonia, eight fluid ounces; Dissolve the bichloride of mercury, by the aid of heat, in water. To this, when it has cooled, add the solution of ammonia, occasionally stirring. Wash the precipitated powder till it is tasteless; lastly, dry it.
Nota.	Note.
Hydrargyri Ammonio-Chloridum. Calore totum in vapores abit. Idem cum acido acetico digestum, nihil indè flavum aut cœruleum, potassii iodido adjecto, demittit. Pulvìs ejus cum liquore calcis contritus non nigrescit. In acido hydrochlorico sine effervescentiâ omne liquatur. Idem liquore potassæ calefactum ammoniam exhalat et colorem flavum induit.	Ammonio-Chloride of Mercury. By heat it is entirely vaporised. When digested with acetic acid, nothing either yellow or blue is thrown down on the addition of iodide of potassium. Its powder when triturated with lime-water does not blacken. It is perfectly soluble in hydrochloric acid without effervescence. When heated with solution of potassa, it exhales ammonia, and acquires a yellow colour.

To this *Note* Mr. Phillips adds the following *Remarks:* "If it contain any fixed impurity it would not evaporate by heat. The nonproduction of yellow or blue colour by iodide of potassium in the acetic solution shows it contains neither oxide of lead nor starch, for this oxide would yield a yellow iodide of lead, and the starch would give a blue precipitate. If lime-water imparted blackness to it, it would indicate the presence of protoxide (protochloride?) of mercury. If it dissolve without effervescence in hydrochloric acid, no carbonate of lime or other carbonate has been mixed with it. There is no other white substance which when heated with potash, yields ammonia and becomes yellow."

According to Professor Kane (*Trans. Royal Irish Acad.* XVII.), this compound, commonly known under the name of *white precipitate of mercury*, is composed of 2 atoms of bichloride of mercury, 2 atoms of ammonia, and 1 atom of peroxide of mercury. Mr. Phillips considers it as containing 1 atom of peroxide of mercury, 1 atom of bichloride of mercury, and 2 atoms of ammonia, and gives the following view of its production. "When 2 equivalents (atoms) of bichloride of mercury are dissolved in water, and ammonia is added to the solution, 2 of water are decomposed, the 2 of hydrogen of which unite with the 2 of chlorine of one of the equivalents of bichloride of mercury, and form 2 of hydrochloric acid, and these combining with 2 of ammonia, give 2 of hydrochlorate of ammonia, which are poured off in the supernatant liquor. The 2 of oxygen of the 2 of decomposed water, unite with the 1 of mercury separated from the 2 of chlorine, and form 1 of binoxide of mercury, which is precipitated with the 1 of bichloride of mercury undecomposed, and 2 of ammonia, forming the *Hydrargyri Ammonio-Chloridum*."



This *ammonio-chloride* is an insipid white powder, insoluble in water, but soluble in sulphuric, nitric, and hydrochloric acid; it is limited to external use, and employed either alone or mixed with a little powdered starch, to destroy vermin, which it effects without much cuticular irritation. The following ointment is also employed for the same purpose, and for the cure of the itch and herpetic eruptions: it is also used in psorophthalmia and other affections of the eyelids.

UNGUENTUM HYDRARGYRI AMMONIO-CHLORIDI.	OINTMENT OF AMMONIO-CHLORIDE OF MERCURY.
℞ Hydrargyri Ammonio-Chloridi, drachmam,	Take of Ammonio-Chloride of Mercury, a drachm,
Adipis, unciam cum semisse;	Lard, an ounce and a half;
Adipi, lento igne liquefactæ, adjice hydrargyri ammonio-chloridum, et misce.	To the lard, melted over a gentle fire, add the ammonio-chloride of mercury, and mix.

HYDRARGYRI IODIDUM.

℞ Hydrargyri, unciam,
Iodinii, drachmas quinque,
Alcoholis, quantum satis sit;

Tere simul hydrargyrum et iodinium, alcohole paulatim adjecto, donec globuli non ampliùs conspiciantur. Pulverem leni calore, intercluso luminis accessu, quamprimùm exsicca, et in vase benè obturato serva.

NOTA.

HYDRARGYRI IODIDUM. Recens subflavum est, calore cautè admoto in crystallos rubros sublime fertur quæ mox flavent, deindè lumine admisso nigrescunt. In sodii chlorido non liquatur.

IODIDE OF MERCURY.

Take of Mercury, an ounce,
Iodine, five drachms,
Alcohol, as much as may be sufficient;

Rub together the mercury and iodine, alcohol being gradually added till globules can no longer be seen. Dry the powder immediately by a gentle heat, access of light being excluded, and keep it in a well-stopped vessel.

NOTE.

IODIDE OF MERCURY. Recent, it is yellowish; heat being carefully applied, it sublimes in red crystals which soon become yellow, and then, light being admitted, they blacken. It is not soluble in chloride of sodium.

PILULÆ HYDRARGYRI IODIDI.

℞ Hydrargyri Iodidi, drachmam,
Confectionis Rosæ Caninæ, drachmas tres,
Zingiberis contritæ, drachmam;

Simul contunde donec corpus unum sit.

PILLS OF IODIDE OF MERCURY.

Take of Iodide of Mercury, a drachm,
Confection of Dog-Rose, three drachms,
Ginger, powdered, a drachm;

Pound them together till incorporated.

HYDRARGYRI BINIODIDUM.

℞ Hydrargyri, unciam,
Iodinii, drachmas decem,
Alcoholis, quantum satis sit;

Tere simul hydrargyrum et iodinium, alcohole paulatim adjecto, donec globuli non ampliùs conspiciantur. Pulverem leni calore exsicca, et in vase benè obturato serva.

NOTA.

HYDRARGYRI BINIODIUM. Calore cautè admoto in squamulas sublime fertur, quæ mox flavent, deindè, ubi refrixerint, rubescunt. In spiritu rectificato fervente pars aliqua liquatur, quæ, ubi refrixerit, in crystallos descendit. Potassii iodido et hydrargyri bichlorido vicissìm dissolvitur ac demittitur. In sodii chlorido omne liquatur.

BINIODIDE OF MERCURY.

Take of Mercury, an ounce,
Iodine, ten drachms,
Alcohol, as much as may be sufficient;

Rub together the mercury and the iodine, alcohol being gradually added, till globules are no longer visible. Dry the powder by a gentle heat, and keep it in a well-stopped vessel.

NOTE.

BINIODIDE OF MERCURY. Heat being cautiously applied, it sublimes in scales which soon become yellow, and when they have cooled, redden. A portion is soluble in boiling rectified spirit, which, on cooling, is deposited in crystals. By iodide of potassium and bichloride of mercury it is alternately dissolved and precipitated. It is totally soluble in chloride of sodium.

UNGUENTUM HYDRARGYRI IODIDI.
UNGUENTUM HYDRARGYRI BINIODIDI.

Hæc eodem modo præparantur, quo UNGUENTUM HYDRARGYRI NITRICO-OXYDI.

OINTMENT OF IODIDE OF MERCURY.
OINTMENT OF BINIODIDE OF MERCURY.

These are prepared in the same way as the OINTMENT OF NITRICO-OXIDE OF MERCURY.

The above iodides of mercury and their preparations are now, for the first time, introduced into the Pharmacopœia.

The iodide or protiodide of mercury is composed of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	61·5
Iodine	1	125	38·5
Protiodide of Mercury	1	325	100·0

The biniodide or periodide consists of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	44·5
Iodine	2	250	55·5
Biniodide of Mercury	1	450	100·0

These iodides are powerful alteratives, and partake, in their therapeutic effects, of the properties of both their constituents. They have been used with success in the treatment of scrofula, and in the cure of syphilis in scrofulous habits: they generally affect the mouth more speedily than other mercurials. They are most conveniently administered in the form of pills, and in the dose of from one-tenth of a grain to a quarter or half a grain twice or thrice a day. As alteratives, in the case of secondary syphilitic symptoms, and in the treatment of diseased bone and periosteum, they are most effectually given in conjunction with iodide of potassium; they require, however, the utmost circumspection in their use.

The ointment of either iodide is applied to ulcers and ill-conditioned sores, and is sometimes successfully rubbed in upon tumours and swelled joints where the object is to promote the action of the absorbents of the part.

Hydrargyri Bicyanidum.

℞ Ferri Percyanidi, uncias octo,
Hydrargyri Binoxydi, uncias decem,
Aquæ destillatæ, octarios quatuor;

Coque simul per horam dimidiam et cola. Liquorem consume ut fiant crystalli. Quod superest aquâ destillatâ fervente sæpiùs lava, et liquores mixtos iterum consume ut fiant crystalli.

Hydrargyri Bicyanidum alitèr præparari potest, adjiciendo hydrargyri binoxydi quantum satìs sit ad saturandum accuratè acidum hydrocyanicum, quod ex potassii ferrocyanido cum acido sulphurico diluto fuerit destillatum.

Nota.

Hydrargyri Bicyanidum (*crystalli*). Translucet et in aquâ totum liquatur. Hic liquor, instillato acido

Bicyanide of Mercury.

Take of Percyanide of Iron, eight ounces,
Binoxide of Mercury, ten ounces,
Distilled Water, four pints;

Boil them together for half an hour and filter. Evaporate the liquor that crystals may form. What remains wash repeatedly with boiling distilled water, and again evaporate the mixed liquors, that crystals may form.

Bicyanide of Mercury may be otherwise prepared by adding binoxide of mercury in sufficient quantity accurately to saturate it, to hydrocyanic acid distilled from ferrocyanide of potassium with dilute sulphuric acid.

Note.

Bicyanide of Mercury (*crystals*). It is translucent, and entirely dissolved by water. This solution, when hydro-

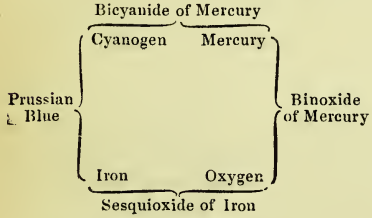
hydrochlorico, acidum hydrocyanicum emittit, quod odore proprio dignoscitur, et in vitrum liquore argenti nitratis humectatum et super impositum, id demittit, quod ab acido nitrico fervente dissolvitur. Calore cyanogenium ejicit, et in hydrargyri globulos coit.

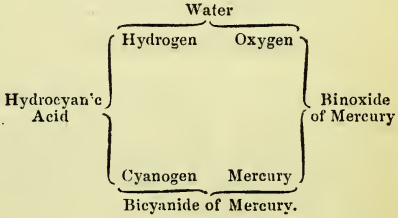
chloric acid is dropped into it, emits hydrocyanic acid, which is distinguished by its peculiar odour, and a glass moistened with solution of nitrate of silver and placed over it, gives a precipitate which is dissolved by boiling nitric acid. By heat it emits cyanogen and runs into globules of mercury.

The bicyanide or cyanuret of mercury consists of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1 . .	200 . .	79·25
Cyanogen	2 . .	52 . .	20·75
Bicyanide of Mercury . . .	1 . .	252 . .	100·00

In the process by which it is obtained by the mutual action of Prussian blue and red oxide of mercury, the mercury of the latter combines with the cyanogen of the former, and the oxygen of the oxide with the iron of the Prussian blue; the decomposition, however, in this case is incomplete. In the second process, the red oxide of mercury and hydrocyanic acid mutually decompose each other, producing water and cyanuret of mercury. These decompositions are represented in the following tables.





Bicyanide of mercury forms prismatic crystals of a metallic taste and very poisonous; they are much more soluble in hot than in cold water, and very sparingly soluble in alcohol. When heated, cyanogen is evolved (page 213).

It has been given in doses of from one-sixteenth to one-eighth of a grain, as a mercurial alterative; it is, however, rarely employed, and its chief use is as a source of hydrocyanic acid.

HYDRARGYRI BISULPHURETUM.

℞ Hydrargyri, libras duas,
Sulphuris, uncias quinque;

Hydrargyrum sulphure ad ignem liquefacto misce, et quamprimùm intumescat massa, vas ab igne remove, et fortitèr tege, ne fiat inflammatio; deindè in pulverem tere, et sublima.

NOTA.

HYDRARGYRI BISULPHURETUM (*rubrum*). Calore in vapores totum abit, et adjectâ potassâ hydrargyrum in

BISULPHURET OF MERCURY.

Take of Mercury, two pounds,
Sulphur, five ounces;

Mix the mercury with the sulphur liquefied over the fire, and as soon as the mass swells up, remove the vessel from the fire, and cover it strongly, lest it inflame; then rub it into powder and sublime.

NOTE.

BISULPHURET OF MERCURY (*red*). When heated it entirely evaporates, and on the addition of potassa the mercury globulos coit. Nec acido nitrico, nec acido hydrochlorico, sed utrisque commixtis liquatur. Spiritus rectificatus, quocum seu lotum seu coctum sit, colorem indè nullum acquirit. Cum acido acetico digestum nihil indè flavum dejicit per potassii iodidum.

runs into globules. It is neither soluble in nitric nor in hydrochloric acid, but in a mixture of the two. Rectified spirit with which it may have been washed or boiled, acquires no colour from it. Digested with acetic acid, nothing yellow is thrown down by iodide of potassium.

To this *Note*, Mr. Phillips adds the following *Remarks:* "When heated by itself it is volatilised undecomposed, but when heated with potash it is decomposed, and mercury is obtained. No acid dissolves it, but the nascent chlorine yielded by the mutual decomposition of nitric and hydrochloric acids converts it into sulphuric acid, and into peroxide of mercury, which dissolves. If it contain any deutoxide of lead, a portion of that would be dissolved by acetic acid, and the solution would give a yellow iodide of lead with iodide of potassium."

This compound, when in mass, is of a gray colour, and somewhat metallic lustre, but when powdered, and especially when levigated, it acquires a brilliant red hue; it is commonly known under the name of *cinnabar*, or *vermilion*, and consists of—

	Atoms.	Equivalents.	Per Cent.
Mercury	1	200	86·2
Sulphur	2	32	13·8
Bisulphuret of Mercury	1	232	100·0

Cinnabar is inodorous and tasteless, and unchanged by air and water. When heated to dull redness in the air, sulphurous acid is formed and mercury evaporates. The only use to which it is applied in pharmacy, is for mercurial fumigation, but the sulphurous acid at the same time produced is sometimes objectionable, so that the protoxide of mercury is preferably employed. It was formerly given as an alterative and deobstruent, especially in cutaneous diseases and in chronic rheumatism; but, according to Orfila, it is perfectly inert. It forms an ingredient in certain nostrums for gout, rheumatism, and the bites of rabid animals; and according to Dr. Paris, to whom we are indebted for exposing the composition of several quack remedies, it is the leading ingredient in *Chamberlain's Restorative Pills;* "*The most certain cure for the scrofula or king's evil, fistula, scurvy, and all impurities of the blood.*"

HYDRARGYRI SULPHURETUM CUM SULPHURE.

℞ Hydrargyri,
Sulphuris, singulorum, libram;
Tere simul donec globuli non ampliùs conspiciantur.

NOTA.

HYDRARGYRI SULPHURETUM CUM SULPHURE (*nigrum*). Calore totum in vapores abit, nullo carbone nec calcis phosphate relictâ.

SULPHURET OF MERCURY WITH SULPHUR.

Take of Mercury,
Sulphur, of each, a pound;
Rub them together till globules are no longer visible.

NOTE.

SULPHURET OF MERCURY WITH SULPHUR (*black*). By heat it is entirely vaporised, no carbon or phosphate of lime remaining.

This is the *Æthiops Mineralis* and *Black Sulphuret of Mercury* of former Pharmacopœiæ, but the only true protosulphuret of mercury (composed of 200 mercury and 16 sulphur) is obtained by passing sulphuretted hydrogen through a dilute solution of protonitrate of mercury. The nature of the above product is shown by the following experiments:—When boiled repeatedly in a solution of potassa, the excess of sulphur is removed, and a black insoluble powder remains, which, when washed and dried, is not acted on by nitric acid, and which at a red heat sublimes without decomposition, and assumes the characters of cinnabar: it, therefore, appears to be a mixture of bisulphuret of mercury and sulphur, and does not contain any of the protosulphuret. The strong attraction of sulphur for mercury is shown by what happens when the ingredients of the above formula are powerfully triturated together in large quantity; they become very hot, cake, and exhale a strong sulphureous odour.

The *hydrargyri sulphuretum cum sulphure* consists of about 42 sulphur and 58 bisulphuret of mercury. In regard to its medicinal employment, it is an inert and useless remedy. From five to thirty grains have been prescribed as an alterative, and certain obstinate cutaneous affections are said to have yielded to its powers. Some have recommended it in scrofulous affections of the glands, and others have ascribed to it peculiar sedative powers; in consequence of its mild and slow operation, it has been especially selected for children; its efficacy is, however, so doubtful, that scarcely any practitioner employs it with confidence, and it might have been rejected from the Pharmacopœia.

UNGUENTUM HYDRARGYRI FORTIUS.	STRONGER OINTMENT OF MERCURY.
℞ Hydrargyri, libras duas,	Take of Mercury, two pounds,
Adipis, uncias viginti tres,	Lard, twenty-three ounces,
Sevi, unciam;	Suet, an ounce;
Tere primùm hydrargyrum cum sevo et exiguo adipis, donec globuli non ampliùs conspici possint; dein adjice adipis quod reliquum est, et misce.	Rub the mercury first with the suet and a little of the lard, till globules can no longer be discerned; then add the remainder of the lard, and mix.

It is generally supposed that in this ointment, as in the mercurial pill, the mercury is only in a highly divided state, and not oxydized. Mr. Donovan, however, has adopted a contrary opinion, and has suggested the use of the protoxide instead of metallic mercury in its preparation (*Annals of Philosophy*, November, 1819). Rancid lard, turpentine, and some other substances, are occasionally, but improperly, employed in this preparation, to facilitate the mixture of the mercury. In warm weather, especially, it is extremely difficult to incorporate the materials; but any of the above additions are apt to render the ointment irritating, and induce an eruption of small pimples, which interfere with the continuance of the mercurial friction. The apparatus mentioned under the article *Pilula Hydrargyri*, is very successfully employed in the formation of this ointment.

In cases requiring the introduction of mercury into the system through the medium of the superficial absorbents, from one to two drachms of the above ointment may be rubbed in every night, upon the inside of the thighs and upon the calves of the legs: its consequences must be carefully watched, and the quantity and repetition of the friction adjusted according to the salivation or other effects which are produced. The inunction should, if possible, be performed by the patient himself, in a warm room or before the fire, till the ointment nearly disappears; and in case of irritation or eruption upon the skin, the place of friction should be varied. If the ointment fails of producing the desired effect, two or three grains of camphor added to each drachm will sometimes excite the absorbents to its reception. Mercurial frictions are rarely prescribed except in the venereal disease, in obstinate hepatic obstructions, and in some dropsical affections with a view to the general excitement of the absorbent system. A slight course of mercurial inunction is also sometimes resorted to in conjunction with alterative remedies, especially in those cases where sarsaparilla is prescribed.

Unguentum Hydrargyri Mitius.	Milder Ointment of Mercury.
℞ Unguenti Hydrargyri fortioris, libram,	Take of stronger Ointment of Mercury, a pound,
Adipis, libras duas;	Lard, two pounds;
Misce.	Mix.

This is an unnecessary formula, for, although it is often required to dilute the stronger ointment, the extent and nature of the dilution must vary. Syphilitic and other sores are occasionally dressed with these ointments; they have also been administered internally, the stronger ointment being given in the dose of from two to five grains, made into a pill with powdered liquorice root, or other inert adjunct; it is said that half a drachm of the ointment thus given in the course of twenty-four hours, will excite salivation; if this be the case, it may be useful where the system is not easily affected by other mercurials.

Linimentum Hydrargyri Compositum.	Compound Liniment of Mercury.
℞ Unguenti Hydrargyri fortioris,	Take of stronger Mercurial Ointment,
Adipis, singulorum, uncias quatuor,	Lard, of each, four ounces,
Camphoræ, unciam,	Camphor, an ounce,
Spiritûs rectificati, fluidrachmam,	Rectified Spirit, a fluidrachm,
Liquoris Ammoniæ fluiduncias quatuor;	Solution of Ammonia, four fluid ounces;
Camphoram primùm cum spiritu tere, deindè, cum adipe et unguento hydrargyri; denique, instillato paulatim liquore ammoniæ, omnia misce.	First rub the camphor with the spirit, then with the lard and ointment of mercury; lastly, gradually dropping in the solution of ammonia, mix them all.

This is a good stimulating liniment in chronic tumours and affections of the joints, where the object is to excite the action of the absorbents. In its employment, its occasional tendency to excite salivation must not be overlooked.

Unguentum Hydrargyri Nitratis.	Ointment of Nitrate of Mercury.
℞ Hydrargyri, unciam,	Take of Mercury, an ounce,
Acidi Nitrici, fluidrachmas undecim,	Nitric Acid, eleven fluidrachms,
Adipis, uncias sex,	Lard, six ounces,
Olivæ Olei, fluiduncias quatuor;	Olive Oil, four fluid ounces;
Hydrargyrum in acido primùm liqua; dein liquorem adhuc calentem adipe et oleo simul liquefactis misce.	First dissolve the mercury in the acid; then, whilst the solution is still hot, mix the oil and the lard melted together.

This ointment, when prepared according to the above formula, is apt to become hard and brittle, in consequence of the action of the acid upon the lard; a preferable compound is obtained when only half the quantity of lard is employed. It is a stimulating ointment, very effective in many cutaneous diseases, and often usefully applied to indolent sores. When diluted with spermaceti ointment, or lard, they should be carefully liquefied in a water-bath. It is a good remedy in purulent ophthalmia, and in the treatment of ulcerated eyelids, to which it should be carefully applied by a camel-hair pencil.

Emplastrum Hydrargyri.	Plaster of Mercury,
℞ Hydrargyri, uncias tres,	Take of Mercury, three ounces,
Emplastri Plumbi, libram,	Plaster of Lead, a pound,
Olivæ Olei, fluidrachmam,	Olive Oil, a fluidrachm,
Sulphuris, grana octo;	Sulphur, eight grains;
Oleo calefacto, sulphur paulatim adjice, spathâ assiduè movens, donec cöierint; dein cum his hydrargyrum tere, donec globuli non ampliùs conspiciantur; tum paulatim adjice emplastrum plumbi lento igne liquefactum, atque omnia misce.	To the oil, heated, gradually add the sulphur, constantly stirring with a spatula till they unite; afterwards rub the mercury with them till globules are no longer visible; then gradually add the plaster of lead, melted, over a slow fire, and mix them all.

Emplastrum Ammoniaci cum Hydrargyro.	Plaster of Ammoniacum with Mercury.
℞ Ammoniaci, libram,	Take of Ammoniacum, a pound,
Hydrargyri, uncias tres,	Mercury, three ounces,
Olivæ Olei, fluidrachmam,	Olive Oil, a fluidrachm,
Sulphuris, grana octo;	Sulphur, eight grains;
Oleo calefacto sulphur paulatim adjice, spathâ assiduè movens, donec cöierint; deinde cum his hydrargyrum tere, donec globuli non ampliùs conspiciantur; denique paulatim adjice ammoniacum liquefactum, et omnia misce.	To the oil, heated, gradually add the sulphur, constantly stirring with a spatula, till they unite; afterwards rub the mercury with them, till globules are no longer visible; lastly, gradually add the ammoniacum, melted, and mix all.

These plasters are occasionally applied to glandular swellings, and to venereal buboes and nodes, when not very painful to the touch; they are also used in hepatic affections applied over the region of the liver.

Toxicological History of Mercury. Poisoning by mercury is by no means uncommon, especially by corrosive sublimate, and by its gradual introduction into the system in consequence of its employment in some of the arts, and from the mining and metallurgic operations, by which it is obtained from its ores.

The mode of action of corrosive sublimate was first accurately investigated by Sir Benjamin Brodie (*Phil. Trans.*, 1812), who found that when large doses were introduced into the stomach, it occasioned corrosion of the part, and paralysis of the heart. From six to twenty grains, injected in solution into the stomach of cats and rabbits, produced, in a few minutes, insensibility and difficult breathing, then convulsions, and, immediately afterwards, death, the duration of the poisoning varying from five to twenty-five minutes. After death, the inner membrane of the stomach was found gray, brittle, and here and there pulpy, and, on opening the thorax immediately after death, the heart either contracted very feebly, or was motionless, and the blood in its left cavity was arterial. Hence it is inferred that the brain was acted on as well as the heart, and that the immediate cause of death was the stoppage of the action of the heart. Sir Benjamin concludes that these organs were not acted upon through the medium of the blood, and that the state of the villous coat of the stomach was such as to preclude absorption. But the accuracy of this opinion is questioned by Dr. Christison, who observes, that the action of a poison as an escharotic is not incompatible with absorption; and moreover, that the effects were not prevented by the previous division of the eighth pair of nerves, which might have been expected did the poison act through sympathy without entering the blood.

Corrosive sublimate is an active poison, to whatever part or tissue in the body it is applied, and, like arsenic, it inflames the stomach and intestines when applied through a wound; and not this only, but, according to Orfila, it also inflames the heart and lungs, producing peripneumony, and apparently carditis.

When corrosive sublimate is injected into the blood, Gaspard found it to produce vomiting, bloody diarrhœa and sputa, and dyspnœa (*Journ. de Physiologie*, I., 165), death taking place in a few seconds, or in three or four days, according to the dose, which varied from one to five grains. The principal appearances on dissection were redness of the mucous membrane of the intestines; and in the lungs, either black spots or tubercular masses, some inflamed, and others gangrenous or suppurated. These effects are accompanied also by salivation, which has been observed in dogs, horses, and rabbits (CHRISTISON, *On Poisons*, chap. XIV., § 2). It would appear, therefore, that in whatever way corrosive sublimate is introduced into the system, it occasions irritation and inflammation of the stomach, rectum, lungs, and probably of the heart and salivary glands, and depresses the functions of the brain.

Dr. Christison discusses at length the question whether the remote effects of corrosive sublimate are, or are not, produced by its direct entrance into the blood, adverting to the cases in which it is stated to have been detected in that fluid, and in the secretions, and even diffused through the brain, bones, and other parts of the body; and although he justly doubts the accuracy of many of the statements which have been made in reference to this important question, he concludes that there is strong presumption in favour of its occasional presence in the animal fluids, though the chemist may not always be able to detect it. In short, all chemists who have experimented on the blood, must be aware of the extraordinary manner in which the action of tests and reagents is modified by that fluid, and of the great difficulty that often occurs in detecting in it substances much more easily discriminated than mercurial salts. Dr. Christison's remarks upon this point are much to the purpose, and apply to other cases than those immediately before us. Experiments have proved that a grain of corrosive sublimate, injected into the blood of a dog, will cause death in two or three days, and, consequently, "if it acts through absorption, it is quite possible, nay probable, that although a larger quantity is applied to an absorbing surface, *a larger proportion may not exist in the blood after death.* Now, the whole blood which can be collected from a middle-sized dog will hardly exceed twenty-four ounces, being about a third of the whole blood in its body. Hence, supposing the whole mercury which originally entered the blood to remain in it at the time of death, (a supposition favourable to the analyst, but which we may be pretty sure does not hold true,) he would have to search for a third of a grain of corrosive sublimate, or, more properly speaking, a quarter of a grain of mercury, mixed with about fifty thousand times its weight of blood, an analysis which could not be brought to a successful issue without very great care and dexterity."

I should be inclined to estimate the difficulty of such an analysis even far beyond that admitted by Dr. Christison, and to adduce it in favour of my own opinion, that poisons (and *medicines*) generally act through the medium of the blood. For, if such obstacles as those just stated occur in the detection of mineral poisons, and if substances, otherwise easy of detection, are, as we know to be the case, masked and concealed, and modified in an extraordinary manner when combined in minute quantities with the blood, how much more must such difficulties occur in the detection of vegetable and animal substances; and how many of these, of a highly active character, should we in vain search for, by any known tests, when largely diluted by blood. The very minute, and even inappreciable quantity of such poisons, which are thus active, is well known; and remedial agents and poisons may, and in all probability do, thus operate, while, at the same time, there is not the smallest chance of our being able to ascertain their presence by direct means.

Dr. Christison arranges the cases of poisoning by mercury in the human subject under three heads. In one variety the leading symptoms are those of irritation of the alimentary canal. In another, these are conjoined with salivation, or other disorders incident to what is called mercurial erethysm. In a third variety, the irritation of the alimentary canal is wanting, and the symptoms are entirely those of some form of erethysm. The first and second varieties are the consequence of large doses of soluble mercurial salts; the third may be caused by any form of mercury.

The symptoms of the first resemble those of arsenical poisoning, but, with regard to corrosive sublimate, they begin sooner, and its taste and acrimony are such, that the sickness, inflammation, and pain during deglutition are much greater, and when the dose is large and not much diluted, it sometimes occasions such tightness and burning in the throat as actually to prevent swallowing. These differences arise from the greater solubility of corrosive sublimate, and its more powerful action upon the animal textures. Dr. Christison also observes, that it is more apt than arsenic to occasion bloody purging and vomiting, and that it more frequently gives rise to urinary irritation, and to nervous affections, during the first stage; and that, "instead of the contracted ghastly countenance observed in cases of poisoning by arsenic, (but which, it will be remembered, is not invariable in that kind of poisoning,) those who are suffering under the primary effects of corrosive sublimate have frequently the countenance much flushed, and even swelled." Lastly, the effects of mercurial poisons are, on the whole, more curable than those of arsenic, and deviations from the ordinary course of the symptoms more rare.

For particular cases, illustrative of these effects of corrosive sublimate, I must refer to Dr. Christison's work, and to the authorities which he has quoted. In respect to the usual duration of this variety of mercurial poison, he observes, that in ordinary cases it is from twenty-four to thirty-six hours; though a few may last three days. In cases of recovery, the symptoms may last very long, but they then often pass into the other variety of this kind of poisoning.

In illustration of the second modification of mercurial poisoning, Dr. Christison cites the following case (from the *Lond. Med. & Phys. Journ.*, XLI., 204). The patient, a stout young girl, swallowed, soon after supper, a drachm of corrosive sublimate, dissolved in beer, and in a few minutes she was found on her knees in great torture. All the primary symptoms of this kind of poisoning were present in their most violent form; burning in the stomach, extending towards the throat and mouth, followed in no long time by violent vomiting of a matter, at first mucous, afterwards bilious and bloody; by purging of a brownish fetid fluid; suppression of urine, and much tenderness of the urethra and bladder; small, contracted, frequent pulse, anxious countenance, and considerable stupor, interrupted by fits of increased pain. All these symptoms were developed in four hours. Subsequently, the pain in the stomach became much easier, but that in the throat much worse. At length, in the course of the second day, the teeth became loose, the gums tender, the saliva more abundant than natural; profuse ptyalism, and great fetor of the breath ensued, and the patient expired towards the close of the fourth day.

The third variety of mercurial poisoning includes certain secondary or chronic effects, some of which are termed *mercurial erethysm* (from *ἐρεθιζειν, to excite*). It has already been stated that particular habits or constitutions are sometimes remarkably affected by mercury, while others are almost unsusceptible of its usual effects; hence the caution with which, in all cases, mercurial remedies should be watched over. In further illustration of this curious subject, it may be mentioned that two grains of calomel have caused ptyalism, ulceration of the throat, exfoliation of the lower jaw, and death (Dr. CRAMPTON, *Trans. Dub. Coll. Phys.*, IV., 91), and that fifteen grains of blue-pill, taken in three doses, one every night, have excited fatal salivation (Dr. RAMSBOTTOM, *Lond. Med. Gaz.*, I., 755). Three drachms of mercurial ointment, externally applied, have occasioned violent ptyalism and death in eight days (Dr. CHRISTISON), and similar effects have resulted from small doses of corrosive sublimate.

The improved methods of treating the venereal disease in modern times, have rendered cases of excessive salivation from the improper continuance of mercury comparatively rare; yet, from the peculiarities just mentioned, and occasionally from carelessness on the part of the practitioner or of the patient, they do occur. In such cases death may ensue from several causes, such as exhaustion from the excessive flow of saliva, or gangrene of the throat or mouth, or laryngeal phthisis. In discussing this subject in a medico-legal point of view, Dr. Christison observes that a preternatural flow of saliva may be derived from other causes than mercury; these it is not necessary here to advert to in detail; among them, we may enumerate certain preparations of gold, copper, and antimony; croton oil, iodine, foxglove, and opium; in some cases of common sore throat, too, there is profuse salivation, and when accompanied by ulceration, the fetor of the breath resembles that from mercury. Salivation also forms an idiopathic disease; but, in general, an attentive inquiry into the concomitant symptoms will enable the practitioner to distinguish these from mercurial cases.

Another of the secondary effects of mercury is, that which attacks persons whose business exposes them to the operation of the poison, such as miners, gilders, mirror-silverers, barometer-makers, and some chemical manufacturers, and in whom it produces a species of *shaking palsy.* This disease is usually gradual in its progress, beginning with tremors and convulsions, which generally first attack the arms; loss of memory and great restlessness ensue; the skin is dry and brown, and the pulse slow, and the patient becomes delirious, and sinks, if not removed from the source of his malady. This disease, if timely attended to, is rarely fatal, unless, indeed, conjoined with salivation.

The miners of Almaden, and of Idria, furnish frequent specimens of this form of mercurial poisoning, especially those who are inattentive to cleanliness; their teeth loosen, the salivary glands swell, and pustular eruptions and tremors ensue. It would, indeed, appear, that exposure to mercurial fumes for a short time only, may produce such effects. Dr. Christison cites the case of a barometer-maker and one of his workmen, who were exposed one night, during sleep, to the vapours of mercury from a pot on a stove in which a fire had been accidentally kindled; they were both most severely affected, the latter with salivation, which caused the loss of all his teeth, the former with shaking palsy, which lasted his whole life. That mercury at common temperatures emits vapours, is shown by its condensation in the upper ends of barometer-tubes; or by suspending a piece of gold leaf over its surface, which soon becomes amalgamated. A curious example of the effects of mercury, apparently so diffused, occurred on board the ships *Triumph* and *Phipps*, in 1810; they were carrying home a quantity of mercury, when, by some accident, several of the packages burst, and the crews of both vessels were severely salivated; two died; all the copper utensils became amalgamated, and nearly all the animals on board were destroyed. Another case, showing that mercury carried about the person may induce poisonous effects, is stated by Dr. Scheel. A man applied to him with violent salivation, which proved fatal, but the cause of which was not ascertained till after his death, when it was discovered that he had been in the habit, for six years, of carrying a small leathern bag, containing a few drachms of mercury, hanging at his breast, as a protection against itch and vermin, and that during that time he had had frequent occasion to renew its contents (*Medizinisch-chirurgische Zeitung*, 1833, IV.) Lastly, the soluble compounds of mercury may excite mercurial action by simple contact with the skin; ptyalism has been induced by a warm bath holding corrosive sublimate in solution, and violent mercurial symptoms have been brought on by the application of spirituous solutions of sublimate to the sound skin. In a case described by Professor Syme, a solution of the nitrate, rubbed by mistake upon the hip and thigh, instead of camphorated oil, occasioned intense pain, shivering, and suppression of urine for five days, during which urea was found in the blood: profuse ptyalism ensued on the third day, followed by exfoliation of the alveolar portion of the lower jaw; nevertheless, recovery slowly took place.

The treatment, in cases of poisoning by mercurial preparations, will of course vary with the symptoms and their causes. Where corrosive sublimate has been swallowed, the white of egg is a valuable antidote; the gluten of wheat is also effectual; and when neither of these is at hand, milk may be resorted to. Iron filings have been successfully administered in these cases; they appear to operate by reducing the mercury to the state of metal.

The treatment of profuse salivation has already been mentioned; cool air, nourishing diet, and mild aperients, are leading remedies; small doses of emetic tartar, so as to act upon the skin, have been recommended by Dr. Finlay, of the United States; and Mr. Daniell advises acetate of lead as an effectual antidote in these cases; large doses of the latter have been found effectual by Dr. Christison. Meconic acid, and the soluble meconates, have also been represented as antidotes to the effects of mercurial poisons, hence the corrective influence of opium over corrosive sublimate. But as this acid and its compounds cannot be obtained in adequate quantities for the purpose, and as opium must itself be given in poisonous doses, to decompose any quantity of corrosive sublimate, these preventives are practically useless.

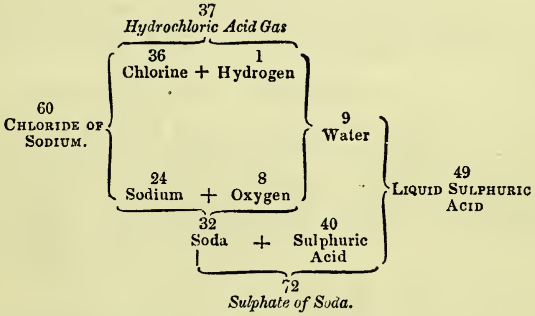
The means of detecting mercury and its salts, will be in part evident from such of their properties as have been already stated. Its volatility, and the facility with which its condensed vapour is collected and recognised, and the ease with which the greater number of its compounds are decomposed when heated in a tube with potassa or lime; the white stain which its solution produces upon copper, and the characteristic precipitates which they afford with potassa and with iodide of potassium, are some of the readiest means of recognising this metal. Galvanic decomposition may also be had recourse to, consisting in applying a drop of the liquid suspected to contain mercury to the clean surface of a gold coin, and then touching it and the coin with zinc or iron; a white spot of reduced mercury adheres to the gold, which is distinguishable from other metals by its volatility when heated. Protochloride of tin is a good test of the presence of corrosive sublimate; it produces a precipitate which is at first whitish, but, on the addition of excess of the precipitant, acquires a dark-gray hue, and is reduced to the state of metallic mercury. When the ready detection of mercurial salts is interfered with by the presence of organic matters, as in the detection of corrosive sublimate in the contents of the stomach, after poisoning, many difficulties occur which have been pointed ont in detail by Dr. Christison in his work *On Poisons*, and to which the reader is referred.

HYDRATES. Definite compounds of substances with water. The term is generally applied to precipitates containing a definite proportion of water after having been dried at a certain temperature; or to substances which, like potassa and soda, retain water even after having been exposed to a red heat. The definite quantity of water which forms a component part of many crystals is usually designated *water of crystallization.*

HYDROCHLORIC ACID. ACIDUM HYDROCHLORICUM.

Muriatic Acid.

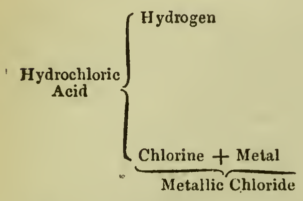
This acid may be produced by the direct union of its component gases, hydrogen and chlorine; when mixed *in equal volumes,* they combine when exposed to light, heat, or the action of the electric spark, and produce a corresponding volume of hydrochloric acid gas: it is, however, generally obtained by the action of liquid or hydrated sulphuric acid upon chloride of sodium, during which hydrochloric acid gas is abundantly evolved, and may be collected over mercury, if required in the gaseous state, or condensed in water so as to form the liquid acid. During the action of hydrated or common sulphuric acid upon salt, the sodium of the salt combines with the oxygen of the water of the acid, to form soda, whilst the chlorine of the salt unites to the hydrogen of the water to form hydrochloric acid; the soda and the sulphuric acid forming sulphate of soda: this decomposition, with the equivalents of the acting bodies, is shown in the annexed diagram:—

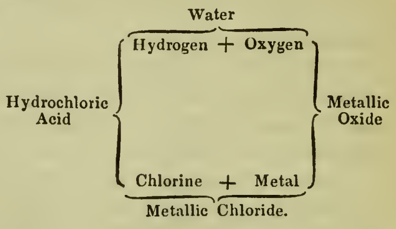


The composition, therefore, of hydrochloric acid is—

	Atoms.	Equivalents.	Per Cent.	Volume.
Hydrogen	1	1	2·75	1
Chlorine	1	36	97·25	1
Hydrochloric Acid	1	37	100·00	2

Hydrochloric acid retains its gaseous form at all common temperatures and pressures, but is liquid under a pressure of 40 atmospheres, at the temperature of 50°. It is intensely acid, unrespirable, and uninflammable: 100 cubic inches weigh 39·4 grains; it has a strong affinity for water, and when it escapes into the air it forms visible fumes, in consequence of its combination with the aqueous vapour of the atmosphere. Water takes up about 480 times its bulk of this gas, so that a few drops of water thrown up into a jar of hydrochloric acid gas standing over mercury, immediately absorbs it, heat being at the same time evolved. Many of the metals and their oxides decompose it both in the gaseous and liquid state; when decomposed, for instance, by potassium or by zinc, chloride of potassium or of zinc is formed, and hydrogen gas evolved; and when potassa or oxide of zinc act upon it, water and metallic chlorides are the products: the action of these substances is shown in the annexed diagrams, and the other hydracids are, for the most part, similarly decomposed.





For all pharmaceutical and medical purposes, hydrochloric acid is used in aqueous solution, which is usually obtained either by condensing the gas into water, or by distilling a mixture of salt and diluted sulphuric acid, as in the process of the Pharmacopœia.

ACIDUM HYDROCHLORICUM.	HYDROCHLORIC ACID.
℞ Sodii Chloridi exsiccati, libras duas, Acidi Sulphurici, uncias viginti, Aquæ destillatæ, fluiduncias viginti quatuor;	Take of Chloride of Sodium, dried, two pounds, Sulphuric Acid, twenty ounces, Distilled Water, twenty-four fluid ounces;
Sodii chlorido in retortam vitream immisso, acidum aquæ fluidunciis duodecim prius mixtum adjice. Aquæ quod reliquum est in receptaculum infunde; tum, retortâ aptatâ, in hanc aquam transeat acidum, balneo arenæ, calore gradatim aucto, destillatum.	To the chloride of sodium introduced into a glass retort, add the acid previously mixed with twelve fluid ounces of water. Pour the remainder of the water into the receiver; then, the retort being fitted to it, let the acid distilled from a sand-bath pass over into this water, the heat being gradually increased.
ACIDUM HYDROCHLORICUM DILUTUM.	DILUTED HYDROCHLORIC ACID.
℞ Acidi Hydrochlorici, fluiduncias quatuor, Aquæ destillatæ, fluiduncias duodecim; Misce.	Take of Hydrochloric Acid, four fluid ounces, Distilled Water, twelve fluid ounces; Mix them.
NOTA.	NOTE.
ACIDUM HYDROCHLORICUM, coloris expers, calore totum in vapores abit. Idem aquâ destillatâ mixtum nihil vel a barii chlorido, vel ab ammoniâ, vel ab ammoniæ sesquicarbonate demittit. In auri laminas, etiam calore adhibito, nullam vim exercet. A liquore sulphatis indigo colorem non abstrahit. Pondus specificum est 1·16. Sodæ carbonatis crystallorum, gr. 132, ab hujus acidi gr. 100 saturantur.	HYDROCHLORIC ACID is colourless; it is entirely evaporated by heat. Mixed with distilled water, nothing is precipitated either by chloride of barium or by ammonia, or by sesquicarbonate of ammonia. Strips of gold, even when heated in it, are not acted upon by it. It does not destroy the colour of solution of sulphate of indigo. Its specific gravity is 1·16. 132 grains of crystals of carbonate of soda are saturated by 100 grains of this acid.

Hydrochloric acid is seldom perfectly colourless; it generally has a yellow tint, derived in some cases from the presence of a little iron. The object of the above tests is to show that it contains no fixed substance, and that neither sulphuric acid nor metallic oxides are held in solution by it. The non-action upon gold and upon sulphate of indigo, proves the absence of free chlorine. When 100 parts saturate 132 of carbonate of soda, it contains about 40 per cent. of hydrochloric acid gas.

Hydrochloric acid is used in a few pharmaceutical preparations only, and is not of much importance in its medical applications. In doses of from ten to thirty drops in an ounce and a-half or two ounces of water, it is used as a tonic refrigerant, and in cases of white deposits in the urine: in such cases, it is best given in barley-water. As a tonic, it may be combined with bitters, but it is apt to relax the bowels. It is a good remedy in some cases of typhus and scarlatina, and in malignant sore throat, both internally, and as a gargle:—

℞ Acid. Hydrochlorici, fʒjss.
Decoct. Cinchonæ lancifol.
Infus. Rosæ compos. āā f℥iijss.
Mellis Rosæ, fʒj.
M. fiat gargar.

In scorbutic ulceration of the gums, the following application, conjoined with proper general treatment, has been found effective:—

℞ Acid. Hydrochlorici, fʒj.
Mellis,
Aquæ Rosæ, āā f℥j.
M. fiat linctus ter vel quater die gingivis applicandus.

It is, according to Dr. Paris, an efficacious remedy, after purges, for preventing the generation of intestinal worms, for which purpose infusion of quassia is its best vehicle.

This acid was at one time supposed to possess a curative power over syphilis, but experience has by no means justified such an opinion. It is sometimes taken as a poison, or by mistake, in poisonous doses; in such cases, solution of soap, or sufficient doses of magnesia, are the best remedies: chalk should be avoided in consequence of the deleterious properties of chloride of calcium, which would be formed in the stomach. It is readily recognised by the curdy precipitate which it produces in solution of nitrate of silver, and which is soluble in ammonia; but in these cases the constant presence of free hydrochloric acid in the stomach must not be overlooked.

HYDROCYANIC ACID. ACIDUM HYDROCYANICUM.

Prussic Acid. This curious compound was first obtained from Prussian blue, by Scheele, in 1782, but its components were not accurately determined till the discovery of *cyanogen*, in 1815, by Gay-Lussac. In its purest form, hydrocyanic acid is obtained by distilling cyanuret of mercury (*see* HYDRARGYRI CYANIDUM) with hydrochloric acid; or by passing hydrosulphuric acid over that cyanuret. It is a limpid and highly volatile liquid, smelling very strongly like bitter almonds; it has an acrid taste, and is eminently poisonous; its specific gravity is 0·7. It boils at 90°, the specific gravity of its vapour being, (compared with air,) 0·947. It is soluble in all proportions both in water and in alcohol. It forms but few salts, and they are very unstable. It is a compound of 1 atom of cyanogen with 1 atom of hydrogen, its ultimate elements being—

	Atoms.	Equivalents.	Per Cent.		Atoms.	Equivalents.
Carbon	2	12	44·4	= Cyanogen	1	26
Nitrogen	1	14	51·9			
Hydrogen	1	1	3·7	Hydrogen	1	1
Hydrocyanic Acid	1	27	100·0		1	27

Hydrocyanic acid is only used in medicine in a very diluted state: it may be thus obtained by distilling cyanuret of mercury with dilute hydrochloric acid; or by condensing the vapour of the pure hydrocyanic acid in any required quantity of water; in the *London Pharmacopœia* two formulæ are given for the preparation of dilute hydrocyanic acid: they are as follow:—

Acidum Hydrocyanicum Dilutum.

℞ Potassii Ferrocyanidi, uncias duas,
Acidi Sulphurici, unciam cum semisse,
Aquæ destillatæ, octarium cum semisse;

Acidum aquæ fluidunciis quatuor misce, hisque, ubi refrixerint, in retortam vitream immissis, potassii ferrocyanidum aquæ octario dimidio priùs liquatum adjice. Aquæ fluiduncias octo in receptaculum frigefactum infunde; tum, retortâ aptatâ, in hanc aquam transeant acidi fluidunciæ sex, balneo arenæ, lento igne, destillatæ. Denique aquæ destillatæ fluiduncias alias sex adde, vel quantum satis sit, ut argenti nitratis in aquâ destillatâ liquatæ gr. 12·7, ab hujus acidi gr. 100, accuratè saturentur.

Acidum Hydrocyanicum Dilutum alitèr præparari potest, ubi ocyus utendum est, ex argenti cyanidi granis 48·5, adjectis aquæ destillatæ fluidunciâ et acidi hydrochlorici granis 39·5, simul commixtis. Omnia hæc in phiala bene obturatâ agita: dein brevi morâ interpositâ in vas aliud liquorem limpidum effunde. Hunc intercluso luminis accessu, in usum serva.

Nota.

Acidum Hydrocyanicum Dilutum. Coloris expers, calore totum in vapores abit odorem proprium spirantes.

Diluted Hydrocyanic Acid.

Take of Ferrocyanide of Potassium, two ounces,
Sulphuric Acid, an ounce and a half,
Distilled Water, a pint and a half;

Mix the acid with four fluid ounces of water, and to these, when cool and put into a glass retort, add the ferrocyanide of potassium previously dissolved in half a pint of water. Pour eight fluid ounces of water into a cooled receiver; then, the retort being fitted on, let six fluid ounces of acid pass into this water, distilled by a gentle heat in a sand-bath. Lastly, add six more fluid ounces of distilled water, or as much as may be sufficient, that 12·7 grains of nitrate of silver may be accurately saturated by 100 grains of this acid.

Diluted Hydrocyanic Acid may be otherwise prepared, when more quickly required for use, from forty-eight grains and a half of cyanide of silver, added to a fluid ounce of distilled water mixed with thirty-nine grains and a half of hydrochloric acid. Shake all these in a well-stopped phial: then, after a short interval, pour off the clear liquor into another vessel. Keep this for use, the access of light being prevented.

Note.

Diluted Hydrocyanic Acid. Free from colour, goes off entirely in vapour by heat, exhaling its peculiar odour.

Lacmum afficit colore rubro, tenui, fugaci; adjecto acido hydrosulphurico non coloratur. Ex hujus acidi gr. 100, liquore argenti nitratis adjecto, demittuntur argenti cyanidi gr. 10 quæ ab acido nitrico fervente facilè liquantur. Acido quodam alio mixtum erit si potassii et hydrargyri iodocyanido rubescat. In hujus acidi diluti gr. 100, acidi hydrocyanici gr. 2 continentur; et ad hanc normam quovis modo destillatum volumus ut redigatur.

It imparts to litmus a slight fugacious red colour; by the addition of hydrosulphuric acid it is not coloured. One hundred grains of this acid, when solution of nitrate of silver is added, throw down ten grains of cyanide of silver, which are easily dissolved by boiling nitric acid. It is mixed with some other acid if it is reddened by the iodocyanide of potassium and mercury. In one hundred grains of this diluted acid are contained two grains of hydrocyanic acid, and to this standard, in whatever mode distilled, we direct that it should be reduced.

If diluted hydrocyanic acid leaves any residue on evaporation, it contains impurities; and if it powerfully and permanently reddens litmus paper, it contains some other acid; if discoloured by hydrosulphuric acid, it contains some metallic salt. If hydrochloric acid be present in it, the precipitate which it affords with nitrate of silver is insoluble in nitric acid, being chloride of silver. Mr. Phillips states that "any acid mixed with the hydrocyanic acid decomposes the iodocyanide of potassium and mercury, and forms biniodide of mercury, which is of a red colour."

In the above formula of the Pharmacopœia, the ferrocyanide of potassium, which in its crystallised state consists of—

	Atoms.	Equivalents.	Per Cent.
Cyanide of Iron	1	54	25·38
Cyanide of Potassium	2	132	61·93
Water	3	27	12·69
Crystals of Ferrocyanide of Potassium	1	213	100·00

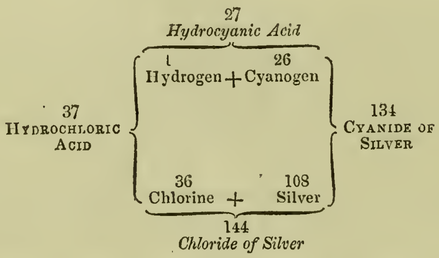
is decomposed by sulphuric acid, and the products are hydrocyanic acid and water, together with bisulphate of potassa, and a ferrocyanide of iron and potassium (*yellow salt* of Mr. Everitt), composed of 2 atoms of cyanide of iron, and 1 atom of cyanuret of potassium.

According to Mr. Everitt, the following changes ensue, when 6 atoms of concentrated sulphuric acid are heated with 2 atoms of crystallised ferrocyanide of potassium.

Before Distillation.	Atoms.	Equivalents.		After Distillation.	Atoms.		Equivalents.
Sulphuric Acid	6	240	=	Bisulphate of Potassa	3		384
Cyanide of Potassium	4	264		Hydrocyanic Acid	3		81
Cyanide of Iron	2	108		Cyanide of Potassium	1	Yellow Salt	66
Water {6 in the acid 6 in the salt}	12	108		Cyanide of Iron	2		108
				Water	9		81
		720					720

Dr. A. T. Thomson (*Lond. Disp.*) observes, in regard to the above formula, that the *yellow salt* is only obtained when the process is stopped at the point directed in the Pharmacopœia; but, that when the distillation is carried on to dryness, an additional quantity of hydrocyanic acid is procured, and the residue consists of bisulphate of potassa and Prussian blue: he also states that by the Pharmacopœia process the acid is always obtained of a pale green colour and requires redistillation to free it from that tint, but that the acid procured by continuing the process to dryness is perfectly colourless; that, therefore, there is waste in the process of the Pharmacopœia, and that the whole of the acid should be brought over, and redistilled, and then diluted to the requisite degree of strength.

In the formula for preparing hydrocyanic acid by the decomposition of cyanide of silver, the cyanogen of the cyanide unites with the hydrogen of the acid, and the silver of the cyanide with the chlorine of the acid, as in the following diagram:—



For the properties and formation of cyanide of silver, *see* page 83.

Medical Properties and Uses. Dr. Granville was the first who introduced hydrocyanic acid to the notice of British practitioners, as a sedative and antispasmodic, more especially useful in spasmodic coughs, and whooping cough, and in the treatment of common and epidemic catarrh. It has also been successfully prescribed in some cases of palpitation of the heart, and in allaying some of the symptoms of aneurism of the aorta. Dr. A. T. Thomson has recommended it as an adjunct to tonics in those forms of dyspeptic irritability of stomach which are accompanied with heat and soreness of the tongue; he also states that he has witnessed its powers in those affections of the trachea which are often confounded with phthisis, and are not less fatal, but that his experience does not enable him to say much in its favour in true tubercular phthisis; in that disease, however, it diminishes the frequency and violence of the cough, allays the dyspnœa, and facilitates expectoration. The sedative and narcotic powers of this acid are available in many cases of nervous irritability, but it has not answered the expectations of those who have used it in painful nervous affections; in such cases, however, it always deserves a careful trial. The dose of the hydrocyanic acid of the Pharmacopœia varies from two to about ten minims, much depending upon the state of dilution in which it is administered. It may be given in distilled water or almond emulsion, and the proportion of the vehicle should be comparatively small. It may be occasionally given with small doses of digitalis, and with hemlock, and should not generally be prescribed in the form of a *mixture*, lest, as is common in such cases, the doses should not be very accurately apportioned. The particular formulæ, also, according to which this and other powerful remedies are presumed to be prepared, should be specified, as those of different Pharmacopœiæ are considerably at variance.

℞ Acidi Hydrocyanici (*Pharm. Lond.*) ♏iv.
Syrupi Aurantii, fʒss.
Aquæ Destillatæ, f℥j.
Misce fiat haustus quarta quâque hora sumendus.

℞ Acidi Hydrocyanici (*Pharm.Lond.*) ♏v.
Mistur. Amygdalæ, ℥j.
Extract Conii, grana iij.
Misce fiat haustus bis vel ter die sumendus.

℞ Misturæ Camphoræ, f℥j.
Acid Hydrocyanici (*Pharm. Lond.*) ♏iv.
Syrupi Papaveris, fʒj.
Vini Ipecacuanhæ, ♏xx.
Misce fiat haustus hora somni sumendus et ter die repetendus sine syrupo papaveris.

Hydrocyanic acid has been applied externally, more or less diluted, in some cutaneous diseases. Dr. Thomson long ago recommended it as a means of allaying the itching and tingling attendant on impetiginous affections. (*Med. and Phys. Journ.*, February, 1822). In these, and all other cases in which it is prescribed, all substances tending to combine with or decompose it, must be carefully avoided, and the most simple vehicles should be selected. When applied as a cataplasm, the crumb of bread may be soaked in a mixture of half an ounce of the acid with three ounces of water; and the following lotion may be applied in cases of cutaneous irritation:

℞ Aquæ Rosæ, f℥viiss.
Acidi Hydrocyanici, f℥ss.
Misce.

Toxicological History. Hydrocyanic acid, and certain vegetable products containing it, such as the oil of bitter almonds, the distilled water of the common laurel, and of a few other plants, rank among the most powerful and rapidly-acting poisons; and of late years, especially, their effects have frequently become the subject of medico-legal inquiry, in consequence of their having been employed as means of suicide and murder; there are also several cases on record in which they have accidentally proved fatal. The varying strength of the officinal hydrocyanic acid, and of the compounds containing it, and their liability to decomposition, must be borne in mind, in reference to the quantities of them which are required to produce fatal consequences. It has been well observed by Dr. Christison, that it is important to determine with some degree of precision the shortest period which elapses before the poison begins to operate, as well as the shortest time in which it proves fatal; and his experiments, with those of other physiologists, have produced some curious and interesting evidence upon these points. A single drop put into the mouth of a rabbit killed it in eighty-three seconds; three drops killed a strong cat in thirty seconds, and began to act in ten; another was affected by the same dose in five, and died in forty seconds. Three drops projected into the eye of a cat, acted in twenty seconds, and killed it in twenty more; and the same quantity dropped on a fresh wound in the loins acted in forty-five, and proved fatal in one hundred and five seconds. In the slower cases there were regular fits of tetanus; but in the very rapid cases, the animals perished just as the fit began to show itself with retraction of the head. In rabbits, opisthonotos, in cats, emprosthotonos, was the chief tetanic symptom. These experiments appear to have been made with the *pure* and *undiluted acid.* With the diluted acid the effects are the same, when the doses are very large, but somewhat different with inferior doses. When an animal is poisoned with a dose not quite sufficient to produce death, it is seized, in about a minute, with giddiness, salivation, convulsions, and gradually-increasing insensibility; after lying in that state for some time, the insensibility goes off and is succeeded by a few attacks of convulsion and giddiness: the whole duration of which varies from half an hour to a day or more. When the dose is larger the animal perishes either in tetanic convulsions or comatose, generally between the second and fifteenth minute. Sometimes, however, the diluted acid acts with a rapidity scarcely surpassed by the pure poison. The appearances on dissection are generally unimportant. In eight experiments on cats and rabbits, with the pure acid, Dr. Christison found that the heart contracted spontaneously, as well as under stimuli, for some time after death, except in the instance of a rabbit killed by twenty-five grains, and one of the cats killed by three grains, applied to the tongue; in these the pulsation of the heart ceased with the short fit of tetanus preceding death; in the rabbit the heart was gorged, and its irritability quite extinct. Experiments have shown that the acid in its diluted state acts with most energy through the serous membranes, and next upon the stomach; that it has no effect upon the trunks or cut extremities of nerves, or when applied to a fissure in the brain or spinal marrow; that its action is not prevented by previously dividing the nerves, but that it is prevented when the vessels of any part are tied before the application of the poison. Notwithstanding, therefore, its extraordinary rapidity of action, it is probable that it acts through the medium of the blood, in which it may often be detected by its odour. From the experiments of Robiquet and Emmert (quoted by Dr. Christison), it appears probable that hydrocyanic acid may excite a deleterious action even through the sound cuticle. It affects all animals nearly in the same manner, and is poisonous in most, if not in all, of its soluble combinations. But the ferrocyanurets, and probably many of the cyanurets, are not poisonous.

The effects of hydrocyanic acid upon the human subject closely resemble those which it produces upon animals. When it has been given medicinally in overdoses, it has produced nausea, salivation, ulceration of the mouth, quick pulse, great anxiety, and a sense of weight and pain in the head. In a case reported by Hufeland, a man who swallowed an ounce of alcoholised acid, containing about forty grains of the pure acid, immediately staggered a few steps, and then sank down apparently lifeless; the pulse was not to be felt, and breathing was for some time imperceptible. After a short interval, he made a forcible expiration; the legs and arms then became cold, the eyes prominent, glistening, and quite insensible, and after one or two convulsive expirations, he died, five minutes after swallowing the poison.

The following case of a French physician is quoted by Dr. Christison, (from the *Revue Médicale*, 1825), as conveying a good idea of the operation of this poison when not quite sufficient to kill. Very soon after swallowing a teaspoonful of the diluted acid, he felt confusion in the head, and soon fell down insensible, with difficult breathing, small pulse, bloated countenance, dilated insensible pupils, and locked jaw. Afterwards, he had several fits of tetanus, one of them extremely violent. In two hours and a half he began to recover his intellect, and rapidly became sensible; but for some days he suffered much from ulceration of the mouth, and violent pulmonary catarrh, which had evidently been excited by the ammonia given for the purpose of rousing him. He had eructations with the odour of the acid, three or four hours after he took it.

Hydrocyanic acid does not appear to accumulate in the system, as is the case with some other poisons. From very large doses, death may ensue in a few seconds, or minutes, but if the individual survive for forty minutes, he will generally, though not always, recover. The smallest fatal dose has not been satisfactorily determined, and will, of course, vary with the state of dilution, the vehicle, the strength of the person, and the fulness or emptiness of the stomach at the time. When its vapour is accidentally snuffed up the nostrils, it is extremely powerful, producing almost immediate insensibility.

The accounts of the morbid appearances observed in the human subject, after death occasioned by hydrocyanic acid, are somewhat at variance; much stress has been laid upon one of its effects, namely, that of producing a prominent and glistening eye, as if the person were alive; but this does not always hold good, and may succeed other causes of death: when, however, it is accompanied by the odour of the acid in the contents of the stomach, or in the blood or viscera, it becomes corroborative of the cause of death. This odour, indeed, is almost the only unequivocal proof in such cases, though it is said not to be always present, and to be occasionally perceptible in the blood, brain, or lungs, when it is not to be discerned in the stomach, in consequence, probably, of the overpowering odour of other matters, or from its having entered into combination with substances accidentally there present. Schubarth states that, if the dose has caused death within ten minutes, the odour will always be found in the blood of the heart, lungs, and great vessels, provided the examination be made within a moderate interval, and the body not exposed to a current of air, or to rain; but that if the dose has been small, so that life is prolonged from fifteen to thirty minutes, it may be impossible to remark the odour, in consequence of the acid having, as he supposes, been emitted by the lungs; and that even when the dose has been so large as to kill in four minutes, if the body has been left in a spacious place for two days, or exposed to a shower for a few hours, the odour may not be perceptible. Turgescence of the vessels of the brain, fluidity and blackness of the blood, venous fulness, whilst the heart and great arteries are empty, are also occasional appearances; but these, and some other peculiarities which have been occasionally observed, are by no means constant or characteristic effects.

Of the means of detecting the hydrocyanic acid, the most important and unequivocal is its characteristic odour, which is perceptible, according to Orfila, where chemical agents fail in its discovery. The salts of the protoxide of iron, common protosulphate of iron, or green vitriol, for instance, are delicate tests of the presence of this acid when it has been previously rendered slightly alkaline by potassa; they then produce with it a gray or greenish precipitate, which becomes deep-blue on the addition of a little diluted sulphuric acid. When sulphate of copper is added to hydrocyanic acid rendered alkaline by potassa, a greenish-blue precipitate ensues, which, on the addition of a little hydrochloric acid, becomes nearly white, and is cyanide of copper. Nitrate of silver occasions a white precipitate of cyanide of silver with hydrocyanic acid, which is distinguished by its solubility in hot nitric acid, by its exhaling the odour of hydrocyanic acid when acted on by hydrochloric acid, and by the evolution of cyanogen when it is dried and heated. These are sufficiently delicate tests of hydrocyanic acid, when it is not encumbered with much foreign admixture; but when it is to be looked for in the dead body, they will often fail, especially where the corpse has undergone decomposition; there is evidence, however, of the poison having been satisfactorily discovered seven days after death, by the following process. The contents of the stomach are to be filtered, neutralised, if alkaline, by diluted sulphuric acid, then distilled from a water-bath till an eighth part has passed over; the odour of the acid is often perceptible in the distilled product, though it could not be previously perceived; and its presence may be further verified by the iron test.

The treatment of persons poisoned by hydrocyanic acid consists in the exhibition of *ammonia*, as suggested by Mr. John Murray (*Edinb. Phil. Journ.*, VII., 124); it should be assiduously applied to the nostrils, and may also be administered internally; but, in either case, care must be taken that it is adequately diluted, so as not to excoriate. *Chlorine* also appears to be a powerful antidote, inspired in a duly diluted state. Lastly, *cold affusion* has also been shown, in some cases, to have averted the fatal effects of hydrocyanic acid. To these remedies it may sometimes be right to add venesection.

HYDROGEN (ὑδωρ, *water;* γενναω, *I generate*).

This gaseous body was first examined in a pure form by Cavendish, in 1766. It is generally obtained, though not perfectly pure, by the action of granulated zinc upon common sulphuric acid, diluted with about six times its bulk of water. It is highly inflammable, burning with a very pale flame. When mixed with twice its bulk of oxygen, and inflamed by a taper, or by the electric spark, it detonates, and *water* is the result (page 77). Hydrogen is generally assumed as *unity* in reference to the combining weight, or *chemical equivalents*, of other substances, for it is that which combines with others in the smallest proportion; hence other bodies are represented by numbers which are multiples of that appropriated to hydrogen.

It is the lightest known form of matter. 100 cubic inches of pure hydrogen gas, at mean temperature and pressure, weigh only 2·1318 grains; compared, therefore, with air, its specific gravity is as 0·0694 to 1·000. Compared with oxygen gas, its specific gravity is exactly as 1 to 16. When perfectly pure, hydrogen gas is inodorous; as, for instance, when liberated by electrolytic action from pure water; but, as usually obtained, it has more or less of a disagreeable smell.

HYDROSULPHURIC ACID. *Sulphuretted Hydrogen.* Although this acid has no place in the *London Pharmacopœia*, it has occasionally been used, in aqueous solution, as an alterative, and especially as a lotion in some obstinate cutaneous eruptions; it also forms an ingredient in Harrogate, and similar mineral waters, and is in frequent employment in the pharmaceutical laboratory as a reagent. It is obtained by the action of hydrochloric acid upon fragments of sesquisulphuret of antimony; or from protosulphuret of iron and sulphuric acid, diluted with four or five times its bulk of water. It may be collected over water, but must be preserved in stoppered bottles, for water, when agitated with the gas, takes up about thrice its bulk, and forms a solution extremely useful as a test of many of the metals. This gas has an extremely nauseous and highly diffusible odour, so that a single cubic inch, escaping into the atmosphere of a large apartment, soon becomes everywhere perceptible. It is permanently elastic at common temperature and pressure, but becomes a liquid under a pressure of 17 atmospheres at the temperature of 50°. In the state of gas, 100 cubic inches weigh 36 grains. It extinguishes the flame of a taper, but is itself inflammable, and burns slowly in contact with air, depositing a portion of its sulphur, and producing water and sulphurous acid. Mixed with one volume and a half of oxygen it detonates; water and one volume of sulphurous acid gas are formed. It is composed of—

	Atoms.	Equivalents.	Per Cent.
Hydrogen	1	1	5·9
Sulphur	1	16	94·1
Hydrosulphuric Acid Gas	1	17	100·0

Sulphuretted hydrogen is a powerful narcotic poison, and as it is occasionally generated by the decomposition of organic matters in privies, sewers, and drains, cases of its deleterious and fatal effects are not very uncommon (*see* Christison, chap. xxxi.) Thenard and Dupuytren found that a bird died immediately in air containing only $\frac{1}{1500}$th part of it; $\frac{1}{800}$th killed a dog, and $\frac{1}{150}$th was fatal to a horse. Chaussier's experiments show that it is fatal whether inhaled, or injected into the cellular texture, stomach, or anus, or merely applied to the skin. When respired in any degree of concentration, it produces faintness, insensibility, and death; if the individual be quickly extricated, vomiting and hawking of bloody froth ensue. Sometimes the exhalations containing sulphuretted hydrogen occasion coma, and sometimes convulsions and tetanic spasms. After death, the blood is fluid and black, the lungs gorged, and the whole body rapidly putrefies. Further details of the effects of the vapours of privies, which generally contain ammonia and sulphuretted hydrogen, will be found in Halle's *Recherches sur la nature du Méphitisme des Fosses d'Aisance*, 1785.

HYOSCYAMI FOLIA ET SEMINA. The *leaves* and *seeds* of *Henbane. Hyoscyamus niger. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

Henbane is a common biennial, growing on commons and waste grounds, and flowering in July. The root is long, white, and fibrous; the stalk is erect, round, woody, branched, covered with long weak hairs tipped with a minute black gland, and about two feet high; the leaves are large, segmented, woolly, and embrace the stem at their base: the flowers are in clusters at the tops of the branches: they consist of a short tube with an expanded limb divided into five obtuse segments: they are yellow, veined with purple; the calyx is divided into five short, downy, pointed segments; the five filaments are tapering, downy at the base, inserted in the tube of the corolla, and furnished with large oblong anthers; the germen is roundish; the style slender, longer than the stamens, and terminated by a blunt stigma: the capsule is oval and divided into two cells, which contain many small, irregular, brown seeds.

In their recent state, the leaves of henbane have a very peculiar nauseous odour, and a bitter taste, both of which qualities are much impaired by drying. The activity of henbane as a narcotic, is said to depend upon an alkaloid, called by Brandes, *Hyoscyamia*, and which appears to exist in greatest quantity in the seeds; he obtained it by adding a small quantity of lime to a strong alcoholic tincture of the seeds; the precipitate was digested in dilute sulphuric acid, filtered, and the solution, containing sulphate of hyoscyamia, was decomposed by carbonate of soda; the hyoscyamia thus precipitated, was dried on bibulous paper, redissolved in absolute alcohol, filtered through a little animal-charcoal, and evaporated, a little water being added towards the end of the process. It forms silky crystals, difficultly soluble in water, readily soluble in alcohol and ether, and yielding crystallisable salts. It has an acrid and nauseous taste, is powerfully narcotic, and when applied in dilute solution to the eye, occasions dilated pupil. The fixed alkalis decompose it, with the evolution of ammonia (GEIGER and HESSE. *Journ. de Pharm.*, xx., 92).

The officinal preparations of henbane are an *extract*, which is directed to be prepared in the same way as the *Extract of Aconite* (page 13), and a *tincture.*

TINCTURA HYOSCYAMI.	TINCTURE OF HENBANE.
℞ Hyoscyami Foliorum exsiccatorum, uncias quinque,	Take of Henbane Leaves, dried, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

The *extract*, when carefully prepared, is the best form for the administration of henbane; the average produce is from four to five pounds from 112 pounds of the fresh herb. The tincture is sometimes resorted to as a substitute for opium, and is given in the dose of one or two drachms; a more certain preparation is obtained by using the seeds instead of the dried leaves in its preparation; they contain, according to the analysis of Brandes—

Fixed oil partly soluble in alcohol	24·2
Concrete fatty matter	1·4
Malate of hyoscyamia, with salts of magnesia, lime, and ammonia	6·3
A trace of sugar	——
Gum, bassorin, and starch	5·1
Phytocolla	3·4
Albumen	4·5
Phosphate, sulphate, and muriate of potassa, lime, and magnesia	3·4
Water and loss	24·1
Woody fibre	27·6

Henbane was used by the ancients as a narcotic remedy, and when given in proper doses, it somewhat resembles opium in its general effects, but instead of having a tendency to constipate, it rather relaxes the bowels. It generally somewhat increases the flow of urine and the perspiration, and in overdoses brings on the symptoms occasioned by narcotic poisons. The infusion, or solution of extract of henbane, applied to the eye, dilates the pupil in the same way but less certainly than belladonna.

Extract of henbane has a dark and dingy-green or olive colour, a strong, heavy, and somewhat fetid odour, and a bitterish and slightly saline taste: as its strength, however carefully prepared, is liable to vary, the proper dose must be learned by trial: from two to five grains at bed-time generally prove effectual: some giddiness and nausea are apt to follow a full dose. The cases in which it is found most useful are those in which opium disagrees, either by producing headache, sickness, or constipation. Sometimes it may be usefully combined with opium, and also with hemlock. According to Dr. Paris, the griping and irritating tendency of colocynth is mitigated by the addition of extract of henbane, and its energies as a purgative, though rendered more mild, are not less efficacious. Hence the occasional advantage, especially in cases of habitual costiveness, of the following formula:—

℞ Extract. Colocynth. compos. ℈ij.
Extract. Hyoscyami, ℈j.
Misce et divide in pilulas xij. Sumatur una pro re nata.

Independent of its more ordinary uses, extract of henbane is of service in allaying the irritation occasioned by red sand in the kidneys, the constipation produced by opium being in such cases sometimes very prejudicial; it may be administered in union with diuretics, or with alkaline remedies, in doses of about five grains at bed-time, either alone, or as follows:—

℞ Sodæ Carbonatis exsiccatæ,
Extract. Hyoscyami, āā gr. v.
Ol. Juniperi, ♏ ij.
Divide in pilulas tres; sumantur horâ decubitûs.

In chronic rheumatism small doses of extract of henbane with mercurial pill and compound powder of ipecacuanha, may be given every four or six hours; or the following may be taken when the pain comes on in the night, and is relieved by perspiration:—

℞ Pilul. Hydrargyri,
Pulveris Ipecacuanhæ compos.
Extract. Hyoscyami, āā gr. v.
Fiat massa in pilulas iij dividenda. Sumantur horâ somni.

In coughs and pulmonary irritation, Dr. Paris prescribes the following as an effectual palliative:—

℞ Extracti Conii,
Extracti Hyoscyami, āā gr. v.
Mucilaginis Acaciæ, f℥ij.
Tere simul donec quam optimè misceantur, et deinde adde
Liquoris Ammoniæ Acetatis,
Aquæ Puræ, āā f℥ss.
Syrupi Rhœados, f℥j.
Fiat haustus quartâ quâque horâ sumendus.

Dr. Thomson states that henbane combined with camphor, may be used with decided advantage in mania.

Poultices containing extract of henbane, and fomentations of the decoction of its leaves, have been prescribed for the relief of scrofulous and cancerous sores; and the dried leaves, smoked in the manner of tobacco, are among the remedies for the toothache.

The effects of henbane as a poison have been described by Choquet as they occurred in two soldiers, who ate the young shoots in a salad; they became giddy and speechless, and the eyes were so insensible, that when the cornea was touched the eyelids did not wink; the pupils were much dilated; the pulse feeble and intermitting, the breathing difficult, and the jaw locked; the limbs were cold, the arms convulsed, and there was that union of coma and delirium called typhomania. One of them vomited freely, under the influence of an emetic, and soon recovered; the other became violently delirious, and continued so till the succeeding evening, when the operation of a brisk purge restored him to his senses. The roots of henbane, which are very poisonous when the plant is fully grown, have been sometimes mistaken for parsneps. The history of a family of six persons thus poisoned, has been related by Mr. Wilmer (*On the Poisonous Vegetables of Great Britain*). They became delirious, and one woman irrecoverably comatose; she died the ensuing morning. Loss of speech, therefore, dilated pupil, delirium, and coma, are the leading symptoms of poisoning by henbane. Emetics and purgatives are the most effective remedies.

HYPNOTICS (ὕπνος, *sleep*). Medicines which cause sleep.

INCOMPATIBLES. This term is frequently applied to medicines which either decompose, or unite with each other, so as to form a compound which is either inert or has distinct properties and effects. Thus sulphuric acid, and the soluble sulphates, are properly said to be *incompatible* in prescriptions with the soluble salts of lead, inasmuch as they produce an insoluble and inert sulphate of lead: upon the same principle chlorine and chlorides are incompatible with the soluble salts of silver.

But it is not to be presumed that substances are always incompatible, because they mutually act upon each other. Emetic tartar and chalk mutually decompose each other, but they are by no means improperly prescribed together; it also occasions precipitates in many vegetable infusions, yet the compound retains activity. An important part of the art of prescribing consists in avoiding unintentional combinations which either destroy or exalt each other's activity.

INFUSA. *Infusions.* (Infundo, *I pour in.*) Solutions of the active principles of vegetable substances, obtained by the action of hot or cold water. In the present Pharmacopœia all the infusions are directed to be prepared with boiling distilled water. They are generally made in earthenware jugs with covers, but the kind of vessel should have been specified, as clean metallic vessels retain the heat longer than those of earthenware, and will, consequently, in many instances, yield a stronger infusion.

Substances containing soluble matter, and of which the properties are liable to injury by boiling, are those best adapted for infusion; but, generally speaking, remedies of a very active nature ought not thus to be administered, as the strength of infusions is liable to vary.

Soft, or distilled water, should be used in preparing infusions; it should be poured boiling hot upon the ingredients, which should be either finely bruised or sliced; if in powder, which may sometimes be expedient, the infusions require filtration through paper, but generally they may be strained through tow, flannel, or linen; they are always to be used cold.

The greater number of the infusions directed in the Pharmacopœia are liable to decomposition in warm weather; a circumstance which should not be forgotten by the prescriber; they should always be prepared fresh for use. Infusion of calumba, and the compound infusions of gentian and of senna, are very liable to change; but in prescriptions, spirituous and saline substances are often dissolved in them, and contribute to their preservation. They are not always proper vehicles for metallic salts, some of which they decompose, modifying their activity, and in some instances rendering them nearly inert; but, because in these cases precipitations and decompositions may ensue, we are not always to conclude that the substances are improperly prescribed in conjunction. Such mixtures may be unchemical or incompatible, but they are not always inactive.

The following are the *Infusions* of the present *London Pharmacopœia:*

Infusum Anthemidis	Infusion of Chamomile.
Infusum Armoraciæ Compositum	Infusion of Horseradish (compound).
Infusum Aurantii Compositum	Infusion of Orange-peel (compound).
Infusum Calumbæ	Infusion of Calumba.
Infusum Caryophilli	Infusion of Cloves.
Infusum Cascarillæ	Infusion of Cascarilla.
Infusum Catechu Compositum	Infusion of Catechu (compound).
Infusum Cinchonæ	Infusion of Cinchona.
Infusum Cuspariæ	Infusion of Cusparia.
Infusum Digitalis	Infusion of Foxglove.
Infusum Diosmæ	Infusion of Buchu.
Infusum Gentianæ Compositum	Infusion of Gentian (compound).

Infusum Krameriæ	Infusion of Rhatany.
Infusum Lini Compositum	Infusion of Linseed (compound).
Infusum Lupuli	Infusion of Hops.
Infusum Pareiræ	Infusion of Pareira.
Infusum Quassiæ	Infusion of Quassia.
Infusum Rhei	Infusion of Rhubarb.
Infusum Rosæ Compositum	Infusion of Roses (compound).
Infusum Scoparii	Infusion of Broom.
Infusum Sennæ Compositum	Infusion of Senna (compound).
Infusum Serpentariæ	Infusion of Serpentaria.
Infusum Simaroubæ	Infusion of Simarouba.
Infusum Valerianæ	Infusion of Valerian.

INULA. *Radix.* Elecampane root. *Inula Helenium.* *Cl.* 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Compositæ.

This plant, though a native of England, is usually cultivated in our gardens. Its root is perennial, large, thick, branched, brown externally and whitish within; the stalk is upright, round, striated, branched, hairy, and about four feet high; the leaves are large, ovate, reticularly veined, with a fleshy midrib, smooth on the upper surface and downy beneath; the flowers are large, yellow, compound, and terminate the stem and branches; the calyx is composed of several rows of strong, imbricated, ovate segments; the corolla consists of numerous florets of two kinds; those of the centre are regularly tubular, divided at the brim into five small segments, and are hermaphrodite, each containing five short filaments, with their anthers so united as to form a hollow cylinder and long germen, which support a slender style, furnished with a bifid stigma. The circumferential florets are female, and at the lower part tubular, but at the upper ligulated and cut at the extremity into three narrow teeth; the female part resembles that of the hermaphrodite florets; the seeds are solitary, striated, quadrangular, and furnished with a simple feather; the receptacle is flat and naked.

Elecampane root has been analysed by Rose, who extracted from it a peculiar vegetable principle, which has been called *Inulin.* A more detailed analysis of the root was afterwards published by Funke. According to John, 100 parts of the dried root contain—

Camphor	0·4
Trace of volatile oil	—
Wax	0·6
Acrid resin	1·7
Bitter extractive	36·7
Gum	4·5
Albumen	13·9
Inulin	36·7
Woody fibre	5·5
Salts of potash, lime, and magnesia	—

This root was formerly supposed to possess considerable expectorant and diuretic powers, but it has long fallen into disuse, and there seems no good reason for retaining it in our present Materia Medica. It forms a prominent ingredient in Ward's paste for the piles. (*See* PIPER.)

IODINIUM. Iodine. (*ἰώδης, violet-coloured.*) This elementary body was discovered in 1812, by M. Courtois; Vauquelin, Gay-Lussac, and Davy, subsequently examined its properties and combinations. It is chiefly obtained from the substance termed *Kelp*, which is the residue of the combustion of sea weed; the kelp is powdered and lixiviated with water; the solution so obtained is evaporated till it deposits crystals, for which purpose it is set aside. The crystals are chiefly chloride of potassium; the mother-liquor is decanted off, supersaturated by sulphuric acid, and allowed again to crystallise; the residuary mother-liquor is then mixed with a sufficient quantity of black oxide of manganese, and distilled in a retort, when the iodine passes over along with the vapour of water, forming violet-coloured fumes, which condense in the neck of the retort and in the receiver, in the form of steel-gray crystals, and of a metallic lustre. Iodine is soft, has a peculiar odour somewhat resembling that of chlorine, an acrid taste, and tinges the skin brownish-yellow. Its specific gravity is 4·94. It is extremely volatile, rising in vapour at a temperature of 120° or 130°; when heated to 220° it fuses, and produces dense violet-coloured fumes. The specific gravity of its vapour, compared with that of air, is 8·7; compared with hydrogen, the specific gravity of its vapour is as 125 to 1. It is slightly soluble in water, and the solution is pale brown; in alcohol, and in ether, it is much more soluble, and the solutions are deep reddish-brown.

The character by which iodine is most distinctly recognised, is that of yielding a dark-blue compound with starch. These last properties are those by which iodine is defined in the *Notes* of the Pharmacopœia; it should have been added, that it is liable to adulterations, and that it is frequently sold in a very moist state, as is shown by pressing it between folds of blotting-paper. If it contain charcoal, plumbago, or oxide of manganese, it is neither entirely volatile, nor perfectly soluble in alcohol, the impurities being left behind. It often contains lead.

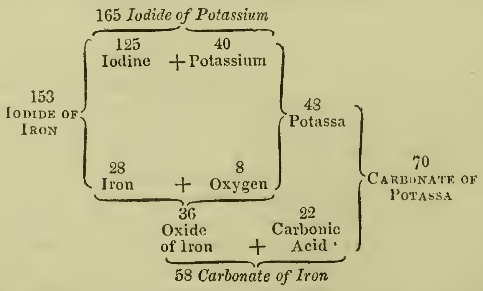
Of the officinal preparations of iodine, its compounds with iron and with mercury have already been mentioned (pages 251 and 289). Its compound with lead will be described under the head of that metal (*see* PLUMBUM). The following remain to be noticed:—

POTASSII IODIDUM.	IODIDE OF POTASSIUM.
℞ Iodinii, uncias sex,	Take of Iodine, six ounces,
Potassæ Carbonatis, uncias quatuor,	Carbonate of Potassa, four ounces,
Ferri Ramentorum, uncias duas,	Iron Filings, two ounces,
Aquæ destillatæ, octarios sex;	Distilled Water, six pints;
Iodinium aquæ octariis quatuor misce, et adjice ferrum, spathâ per dimidiam horæ partem subindè movens. Calorem lenem adhibe, et facto jam colore subviridi, potassæ carbonatem in aquæ octariis duobus priùs liquatam adde, et cola. Quod restat in aquæ destillatæ ferventis octariis duobus lava, iterumque cola. Consumantur liquores commixti ut fiant crystalli.	Mix the iodine with four pints of the water, and add the iron, stirring them frequently with a spatula for half an hour. Apply a gentle heat, and when a greenish colour occurs, add the carbonate of potassa, first dissolved in two pints of the water, and filter. Wash what remains with two pints of boiling distilled water, and again filter. Let the mixed liquors be evaporated, so that crystals may be formed.

NOTA.	NOTE.
POTASSII IODIDUM (*crystalli*). Et aquâ, et alcohole, totum liquatur. Curcumæ colorem vel non omninò vel levitèr modò mutat. Lacmi colorem non mutat. Igne subjecto, nihil ponderis amittit. Acido sulphurico et amylo simul adjectis, cœruleum fit. Hujus salis gr. 10 argenti nitratis gr. 10·24 permutandis sufficiunt, quodque dejicitur, acido nitrico partim liquatur et partim facie suâ mutatur; quod not fit adjectâ ammoniâ.	IODIDE OF POTASSIUM (*crystals*). Totally soluble in water and in alcohol. It changes the colour of turmeric either not at all or only slightly. It does not change the colour of litmus. Subjected to heat it loses no weight. Sulphuric acid and starch being added to it together, it become blue. 10 grains of this salt are sufficient for the decomposition of 10·24 grains of nitrate of silver, and that which is precipitated is partly dissolved by nitric acid, and partly altered in its appearance; which does not occur when ammonia is added.

The entire solubility of iodide of potassium in water and in alcohol is probably intended to show the absence of certain foreign salts with which it might otherwise be adulterated; and its non-action upon turmeric and litmus indicates its neutrality. When thoroughly deprived, by drying, of adherent and interstitial water, it is anhydrous, and does not therefore lose weight when heated. It is decomposed, and iodine is evolved, by the action of sulphuric acid; consequently, the free iodine then forms a blue compound with starch. If it decomposes more nitrate of silver than above stated, it probably contains chloride of potassium. The iodide of silver which is formed, is insoluble in ammonia, by which it is distinguished from chloride of silver. The object of the statement that it is partly altered in appearance, and partly dissolved, by nitric acid, is not very evident.

In the above process for the formation of iodide of potassium, an iodide of iron is first formed, and this is decomposed by carbonate of potassa; carbonate of iron is precipitated, and iodide of potassium is retained in the solution, and afterwards separated by evaporation and crystallisation. The theory of the decomposition, and the equivalents of the acting bodies, are shown in the following diagram:—



Iodide of potassium is readily obtained by dissolving iodine in solution of potassa till the liquid begins to acquire a brown colour, evaporating the solution to dryness, fusing the residue, dissolving it in water, and again evaporating so as to form crystals. It may also be obtained by the decomposition of iodide of zinc (which is easily formed by the mutual action of iodine and zinc filings) by carbonate of potassa; the precipitate is separated by filtration, and the filtered liquor evaporated till it yields crystals of the iodide of potassium. These processes are in some respects preferable to that of the Pharmacopœia.

Iodide of potassium forms deliquescent cubic crystals, of a pungent bitterish taste, extremely soluble in water, sparingly soluble in anhydrous alcohol, but more soluble in common alcohol or rectified spirit. The aqueous solution of this salt readily dissolves iodine. Iodide of potassium consists of—

	Atoms.	Equivalents.	Per Cent.
Potassium	1	40	24·2
Iodine	1	125	75·8
Iodide of Potassium	1	165	100·0

LIQUOR POTASSII IODIDI COMPOSITUS.	COMPOUND SOLUTION OF IODIDE OF POTASSIUM.
℞ Potassii Iodidi, grana decem, Iodinii, grana quinque, Aquæ destillatæ, octarium; Misce ut liquentur.	Take of Iodide of Potassium, ten grains, Iodine, five grains, Distilled Water, a pint; Mix, that they may be dissolved.

TINCTURA IODINII COMPOSITA.	COMPOUND TINCTURE OF IODINE.
℞ Iodinii, unciam, Potassii Iodidi, uncias duas, Spiritûs rectificati, octarios duos; Macera donec liquentur, et cola.	Take of Iodine, one ounce, Iodide of Potassium, two ounces, Rectified Spirit, two pints; Macerate till they are dissolved, and filter.

UNGUENTUM IODINII COMPOSITUM.	COMPOUND OINTMENT OF IODINE.
℞ Iodinii, drachmam dimidiam, Potassii Iodidi, drachmam, Spiritûs rectificati, fluidrachmam, Adipis, uncias duas; Iodinium et potassii iodidum cum spiritu primùm contere, dein adipe misce.	Take of Iodine, half a drachm, Iodide of Potassium, a drachm, Rectified Spirit, a fluidrachm, Lard, two ounces; First rub the iodine and the iodide of potassium with the spirit, then mix with the lard.

Medical Properties and Uses of Iodine. The discovery of iodine has furnished the medical practitioner with a highly important and peculiar remedial agent, respecting the safety and operation of which there is, however, much difference of opinion. All evidence seems to concur in the dangerous effects of free or uncombined iodine. Orfila states that, having taken it in a dose of four grains, it produced constriction in the throat, sickness, and cholic. Dr. Gairdner (*Essay on Iodine*) mentions the case of a child four years old, to whom twenty grains proved fatal. Foreign authors (cited by Dr. Christison) describe the effects of overdoses of iodine to be pain, vomiting, bloody diarrhœa, shivering, and rapid pulse. In a case in which two drachms and a half were taken for the purpose of self-destruction, it immediately produced a sense of burning and dryness in the œsophagus, lacerating pain in the stomach, and efforts to vomit; and in an hour, when the relater first saw the patient, there was suffusion of the eyes, excessive pain and tenderness of the epigastrium, and sinking of the pulse. Vomiting was then brought on by warm water, copious yellow discharges, having the smell of iodine, took place, and in nine hours the patient was well. In fatal cases, the appearances after death are those of the effects of an irritant poison, such as redness and excoriation of the villous and of the peritonæal coat of the stomach, gangrenous discolourations of it and of the intestines, adhesions, and in some cases enlargement and inflammation of the liver.

In medicinal doses, and those even small ones, iodine has been represented as highly dangerous, and as producing singular and hazardous symptoms in consequence of absorption and accumulation in the system, for it is admitted on all hands that it pervades many of the secretions, more especially the urine, and there is undoubted evidence of its having been found in the blood. Its effects in such cases are either those of irritation, such as vomiting, purging, foul tongue, rapid and extreme emaciation, cramps, and tremulous pulse; or in other instances extreme debility, anxiety, faintness, palpitation, and in females absorption of the mammæ. These and other symptoms constitute a form of disease which has been termed *iodism:* it has been described by Dr. John as attended by absorption of the fat, increased excretions, dingy skin, clammy sweat, hurried anxious breathing, diuresis, and an appearance of oil floating upon the urine, feeble pulse, and impaired digestion. These and other symptoms have not only been ascribed to iodine, but also to its *compounds;* the latter, however, may certainly, when cautiously prescribed, be employed without any such effects, and as there seems to be no reason for assuming that iodine itself is capable of fulfiling any indications which cannot be attained by its comparatively harmless combinations, more especially by the iodide of potassium, the use of uncombined iodine may safely be dispensed with.

Iodide of potassium has been successfully used as a powerful *alterative* in a multiplicity of diseases. As a stimulant of the absorbent system, it has effected wonders in cases of bronchocele, swelled testicle, scrofula, and other glandular tumours; and it has reduced enlarged liver, and spleen, where mercury had been tried in vain. It has also been recommended in chronic rheumatism, and in rheumatic enlargement of the joints. By some it is stated to possess considerable emmenagogue powers. It exerts, according to Mr. Aston Key (and others have corroborated his experience), a marked control over the ulcerative process, the most active phagedænic ulcers being often found to yield to its influence, and put on a healthy granulating appearance. It is undoubtedly effectual in relieving and curing secondary syphilitic symptoms of the bones, periosteum, and skin.

The doses in which iodide of potassium may be safely and effectively administered, and the effects which arise during its use, have been very variously stated. From two to ten grains twice or thrice a day, dissolved in an ounce or an ounce and a half of water, or other proper vehicle, is the usual quantity in which it is prescribed, and there seem to be few cases in which it is necessary to go out of those limits. Dr. Buchanan has given half an ounce of it within twelve hours without any bad effect, provided diluents were largely taken at the same time; there is no necessity, however, for these large doses, and the cases must be very rare in which they are justifiable, though by adequate dilution they might perhaps be further increased if any object were to be attained by the pursuit of such an experiment. Dr. Buchanan's remarks upon the detection of iodine in the blood and in the secretions in these cases, are very interesting. Two drachms were given to a young man affected with gonorrhœa, and as soon as the medicine made its appearance in the urine, which was four hours afterwards, blood was drawn from his arm. On examining the blood, both the serum and the crassamentum were found deeply impregnated with iodine. The same dose was given to a boy affected with dropsy of the knee-joint, from which it had been resolved to draw off the fluid. About five hours after the dose had been taken, a very small puncture was made into the joint, and upwards of twelve ounces of synovia drawn off by a cupping-glass. The synovia contained iodine in abundance. To an old man, who had a very large hydrocele, two drachms of iodide of potassium were given over-night, and the same quantity the following morning: on tapping him some hours after he had taken the last dose, more than thirty ounces of serum were drawn off, containing a large quantity of iodine (*Lond. Med. Gaz.*, xxiii., 519).

Dyspeptic symptoms, restlessness, and slight salivation, are the most common consequences of iodide of potassium, when it has been given for some days, or even weeks, in moderate doses; it sometimes appears to constipate, and sometimes slightly relaxes the bowels; but its curative effects proceed in the generality of cases independent of any others worth mentioning, and persons who are fully under its influence usually require no particular care, except such as relates to diet; excess of food, greasy and indigestible dishes, and the stimulation of wine, should be avoided.

Iodide of potassium is sometimes prescribed in pills; but they are an injudicious form for its administration. It is best given in solution, and substances likely to modify or decompose it, should of course be considered as incompatible.

℞ Potassii Iodidi, gran. ij.
Infusi Aurantii compos. f℥x.

Misce; fiat haustus bis die sumendus, meridie scilicet, et horâ ante prandium. (Augeatur dosis iodidi gradatim, si opus sit.)

℞ Potassii Iodidi, gran. x.
Aquæ Cinnamomi,
Aquæ destillatæ, āā f℥iijss.
Tinctur. Cardam. compos.
Syrupi Zingiberis, āā f℥ij.

Misce sumatur tertiam partem ter quotidie.

Another form of iodine, strongly recommended by Dr. Buchanan, is the *iodide of starch*. He prepares it for medical use by triturating twenty-four grains of iodine with a little water, and gradually adding an ounce of finely-powdered starch. The whole is well rubbed together till the compound assumes a perfectly uniform and very deep blue colour, and then carefully dried by a heat so gentle as to run no risk of driving off iodine: it should be kept in a well-stopped phial. Dr. Buchanan commenced the use of this compound in the cautious dose of ten grains; equivalent to half a grain of iodine: this was gradually increased to four scruples, or four grains of iodine, in the course of the day, without exciting any unpleasant symptom. Proceeding in the same gradual manner, the dose was augmented to four drachms, equivalent to twelve grains of iodine daily, and no gastric irritation was induced, although the secretions were deeply impregnated with iodine. In this and other cases this same dose was long continued without bad consequences; the quantity, therefore, was gradually increased, first to half an ounce, and then to one ounce, three times a day, equivalent to seventy-two grains of iodine daily; still no symptoms of gastro-intestinal irritation, and no other symptoms of an unpleasant kind, showed themselves, while the secretions, and more especially the urine, were very deeply impregnated, becoming as black as ink when tested by nitromuriatic acid and starch. Dr. Buchanan goes on to say, that having satisfied himself of the safety of such doses, he has been in the habit, in persons not labouring under any dyspeptic ailment or constitutional delicacy, and whom he wished to put under the influence of iodine, of commencing with half-ounce doses of the above iodide of starch, and increasing them immediately afterwards to ounce doses if necessary.

From the above statement it has been assumed that the iodide of starch must be inert, or pass off unaltered by the bowels; but iodine is always found abundantly in most of the secretions, such as the urine especially, the saliva, and nasal mucus and tears; but not in the perspiration, and never in the fæces. No good evidence can, however, I think be adduced in favour of the enormous doses of iodine here alluded to; nor does there seem any good reason for preferring the iodide of starch to the iodide of potassium, especially when the latter can be easily procured, and in a state of purity.

Dr. Buchanan presumes in these cases that the iodine is converted into hydriodic acid, and that even iodide of potassium undergoes a similar change; that, consequently, the medicinal effects of iodine are referable principally, if not entirely, to the formation of that acid in the stomach; he was therefore led to the exhibition of hydriodic acid, with a view of determining how far it agreed in its general medicinal properties with the other iodic compounds. He prepared it according to the following formula, which he says yields it sufficiently pure for medical use:—

> ℞ Iodidi Potassii, grana 330,
> Acidi Tartarici, grana 264,
> Solvantur seorsim in aquæ destillatæ, ℥iss. Misceantur solutiones et quum subsiderit bitartras potassæ, cola. Colato adde aquæ quantum sufficiat ut sint totius liquoris, drachmæ quinquaginta = f℥vj. ʒij. Acidum hoc hydriodicum liquidum habet iodinii, gr. v. in singulis drachmis.

Of this acid, Dr. Buchanan gave three drachms, equal to fifteen grains of iodine, in the course of the day, and gradually increased it to an ounce and a half daily; this was his ordinary dose; though in some instances he gave as much as one ounce, three times a day, equal to two drachms of iodine daily. During the use of this acid, iodine was found abundantly in the urine, but not in the perspiration, nor in the purulent secretion of sores. In the generality of cases, the patients employing these large doses of iodine enjoyed good digestion and appetite, and were improved in *condition*. "Of the two great alterant medicines we possess, iodine and mercury, it is certainly a most important advantage of the former over the latter, that it admits of being given freely, not only without injury, but with advantage, to the general health; while mercury given in full doses, is always a dangerous medicine, and often the means of doing irreparable injury to the constitution. The iodide of starch frequently caused costiveness, attended with griping pains of the bowels, and with a paleness, approaching to a clay-colour, of the alvine discharges."

Without meaning to recommend them in practice, I have thought it right to give these evidences of the comparative inertness of large doses of iodic compounds: they seem to corroborate the statement that where iodine proves mischievous in small doses, it is owing to its being in a free state, and that it then operates as a corrosive poison. The *Tincture of Iodine*, therefore, and the *Compound Solution of Iodine* of the Pharmacopœia, are objectionable formulæ. We have, however, as yet, but an imperfect acquaintance with the real merits of this curious remedy, and as every day is bringing in new information respecting it, it may be hoped that the discrepant statements which have been made will soon be reconciled.

Should cases of medico-legal inquiry occur, in which iodine or its compounds are implicated, it deserves to be remembered that it may always be traced in the urine, and that in some cases its presence may even be detected in that secretion, four, five, or even six days subsequent to its administration. The blue colour which it produces with starch is a delicate test of its presence, but thus to be indicated, it must be in a free state. To detect it, therefore, when combined with hydrogen or with potassium, as in the hydriodic acid, and in the iodide of potassium, those compounds must be decomposed by sulphuric or nitric acid, and the starch test will be effective. An elegant and accurate test of the presence of iodine is obtained by mixing the solution suspected to contain it with a solution of starch; a few drops of each, in a watch-glass, for instance; and then applying the platinum electrodes of a small voltaic power; the iodine is elicited at the anode, or electro-positive surface, and there the blueing immediately ensues.

In complex mixtures, organic and inorganic, Dr. Christison recommends the following system of analysis for the detection of iodic compounds. " Add water, if necessary, and filter, and if the fluid which passes through is tolerably free from colour, test a little of it with sulphuric acid and solution of starch. If the colour is too deep to admit of this trial, or the test on trial does not act, unite the fluid and solid parts and transmit sulphuretted hydrogen to convert any free iodine into hydriodic acid. Drive off the excess of gas, supersaturate with a considerable excess of potassa, filter, and evaporate to dryness. Char the residue at a low red heat in a covered crucible; pulverise the charcoaly mass, and exhaust with water. The solution will probably act characteristically with starch and sulphuric acid; but on the whole, it is better in the first instance to remove some of the salts by evaporating to dryness and exhausting the residuum with alcohol. The alcoholic solution contains the iodide of potassium with some other salts, and on being evaporated to dryness, a residuum is left, on which, when dissolved in water, the starch and sulphuric acid will act characteristically. No other test is necessary, and frequently no other test will act, in consequence of co-existing salts." By this process, one grain of iodide of potassium may easily be detected in six ounces of urine. It must be recollected in all cases where starch is used as a test of the presence of iodine, that the blue iodide is soluble in hot water with the loss of its colour, but that as the solution cools the blue colour returns.

Iodine is applied externally in the form of ointment, and is often effectual in promoting the absorption of enlarged glands, especially when it is at the same time administered internally. In some cases of neuralgia, also, iodine ointment has relieved the pain. The *Unguentum Iodinii Compositum* of the Pharmacopœia is a good formula for these purposes; it may be diluted, if requisite, with spermaceti ointment; and it sometimes appears to be rendered more effective by the addition of camphor.

It has been proposed in some cases of tubercular phthisis to inhale aqueous vapour impregnated with iodine; it increases the secretion of bronchial mucus.

IPECACUANHA. *Radix.* The *root* of the *Cephaëlis Ipecacuanha. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Cinchonaceæ.

This plant is found in the woods of Brazil and the mountains of New Granada. The root is perennial, simple, or divided into a few diverging branches seldom more than four or six inches long, about as thick as a goosequill, ringed; when fresh, pale brown; when dry, umber-coloured, blackish, or grayish brown; the cortical integument with a reddish, resinous, glittering fracture, and readily separating from a central woody axis. Stem suffruticose, from two to three feet long, ascending, often rooting near the ground, smooth and cinereous at the base, downy and green near the apex. Leaves seldom more than four to six on a stem, opposite, oblong-obovate, acute, three to four inches long, one to two broad, roughish with hairs; petioles short, downy; stipules erect, oppressed, membranous, four to six-cleft. Peduncles solitary, axillary, downy, erect when in flower, reflexed when in fruit, about an inch and a half long. Flowers capitate; involucre one-leafed, spreading, deeply four to six-parted, with obovate acuminate, ciliated segments. Bracts to each flower, one, obovate-oblong, acute, downy. Calyx minute, obovate, with five bluntish, short teeth. Corolla white, funnel-shaped; tube cylindrical, downy on the outside and at the orifice: limb shorter than the tube, with five ovate reflexed segments. Stamens five; filaments filiform, white, smooth; anthers linear, longer than the filaments; projecting a little beyond the corolla. Ovary with a fleshy disk at the apex; style filiform; stigmas two, linear. Berry ovate, about the size of a kidney bean, dark violet, crowned by the small calyx, two-celled, two-seeded, with a longitudinal fleshy dissepiment. Nucules plano-convex, furrowed on the flat side (*Lindley*).

This is the species of ipecacuanha which is most esteemed; it is usually called *Annulated Ipecacuanha:* it is also known under the name of *Brazilian* and *Lisbon Ipecacuanha.* It is imported in bales from Rio Janeiro; it is in short wrinkled or knotted pieces, covered with a gray-brown epidermis, and having a central woody fibre, surrounded by a pale gray cortical part, which breaks short and resinous, and in which its virtues reside; the larger, therefore, its relative proportion the better.

The colour and some of the characters of this species vary, according to the soil in which it has grown; the varieties called brown, black, and red ipecacuanha, are probably produced by such causes.

The roots of some other South American plants are also imported into Europe under the name of *Ipecacuanha.* The variety, for instance, called *undulated* or *amylaceous Ipecacuanha*, is the root of the *Richardia* or *Richardsonia scabra*, *pilosa*, or *Braziliensis;* it is of a grayish-white colour, and rather indented than annulated; its fracture is not resinous, but mealy, and it generally has a nauseous musty odour. Another root is the *black*, *striated*, or *Peruvian Ipecacuanha;* it is of a blackish or brownish-gray colour, resinous fracture, and affords a dark gray powder. Other roots are also occasionally met with in commerce under the name of *Ipecacuanha*, which do not belong to the family of the *Cinchonaceæ;* those of the *Ionidium Ipecacuanha*, for instance, which belongs to the *Violaceæ*, is sometimes substituted for the genuine root, in the province of the Mines of Brazil: they contain *emetina*, but in smaller quantities than the roots of the cephaëlis.

The varieties of ipecacuanha contain a peculiar principle to which their powers are owing, and which has been termed *Emetina:* it was discovered by Pelletier and Magendie, in 1817. It may be obtained by digesting powdered ipecacuanha, first in ether, by which the fatty matter is abstracted, and then in alcohol; from the alcoholic solution magnesia throws down impure emetina; the deposit is well washed with cold water, dried, and boiled in alcohol; from this solution the emetina is obtained by evaporation. Emetina may also be obtained by digesting powdered ipecacuanha in dilute sulphuric acid, precipitating by magnesia, washing and drying the precipitate, and digesting it in alcohol.

Emetina is yellowish, uncrystallisable, bitter, fusible at about 125°, soluble in pure alcohol, but nearly insoluble in water and in ether. It has an alkaline reaction upon reddened litmus paper, but its salts have not been satisfactorily examined. It forms an insoluble precipitate with infusion of galls, which is said to be inert. It consists, according to Pelletier and Dumas, of—

Carbon	64·6
Hydrogen	7·8
Oxygen	22·9
Nitrogen	4·3
	99·6

The *fatty matter* of ipecacuanha has a nauseous odour, especially when heated, and an acrid taste; it appears to be nearly inert, or, at all events, not emetic.

The following are the results of Pelletier's analysis of the varieties of ipecacuanha.

	Brown Ipecacuanha.		Red Ipecacuanha.	Richardsonia Scabra.	Psycotria Emetica.
	Cortical Portion.	Central Fibre.	Cortical Portion.		
Emetina	16	1·15	14	6	9
Fatty matter	2	trace	2	2	12
Wax	6	do.	0	0	
Gum	10	5·10	16	0	79
Starch	42	20·10	18	92	
Woody fibre	20	66·40	48		
Extractive	0	2·45	0	0	trace of gallic acid
Loss	4	4·80	2	0	
	100	100·00	100	100	100

Emetina produces vomiting in doses of less than one grain, but that which is usually obtained is impure, and therefore of variable power. According to Magendie, two grains of pure emetina will kill a dog, the symptoms being frequent vomiting, followed by drowsiness, coma, and death in from fifteen to twenty-four hours. The same effects follow its injection into a vein, and its application to a wound. In the dead body, the stomach and the lungs are found inflamed. Emetina is rarely employed; its only advantage seems to be that of activity in much smaller doses than ipecacuanha; its high price and uncertain purity ought, therefore, to exclude it from use.

Properties and Uses of Ipecacuanha Root. Ipecacuanha is generally used in the form of powder, and in pulverising it, the central woody fibre, or meditullium, which constitutes about a fifth part of the weight of good ipecacuanha, should be rejected. It is not easily pulverisable unless it has been well dried, and the dust which it throws off during the process is apt to excite great irritation of the respiratory organs. In some persons, the mere odour of the root produces a distressing sense of tightness across the chest, and violent sneezing. Dr. Prieger has published a case of a druggist's servant who, in consequence of inhaling the dust of ipecacuanha, was attacked with vomiting and an alarming sense of suffocation; the dyspnœa remained several days, but the uneasiness in the throat was soon removed by the use of decoction of rhatany and uva-ursi. The following case of Mr. Roberts, a surgeon at Dudley, is recorded by Mr. Pereira (*Med. Gaz.*, XVIII. 788). "If I remain in a room where the preparation of ipecacuanha is going on, for instance, making the *Pulvis Ipecacuanhæ Compositus*, I am sure to have a regular attack of asthma. In a few seconds, dyspnœa comes on in a violent degree, attended with wheezing, and great weight and anxiety about the præcordia. The attack generally remains about an hour, but I obtain no relief until a copious expectoration takes place, which is invariably the case. After the attack is over I suffer no further inconvenience. I have always considered that the attack proceeds from the minute particles of ipecacuanha floating in the atmosphere, acting as an irritant on the mucous membrane lining the trachea and bronchial tubes."

The medical effects of ipecacuanha vary considerably with the dose, the mode of preparation, and the adjuncts. In very small doses, it is expectorant and tonic; in larger doses it nauseates, and has a sudorific and aperient tendency; its decoction, after long boiling, loses its emetic powers, but remains laxative; when conjoined with opium it is a certain and powerful diaphoretic; and in larger doses it vomits: it is, therefore, calculated to fulfil a variety of indications.

In the dose of a quarter of a grain to a grain every three or four hours, ipecacuanha is diaphoretic and expectorant; and in the latter sense is a valuable remedy in inflammatory catarrhal affections, more especially of children, to whom the wine of ipecacuanha may be given in doses of from five to twenty drops. In these smaller doses, also, that is, barely to nauseate, it is found to lessen the impetus of the circulation, and hence is said to be of service in active hæmorrhage.

In doses of from one to three grains, ipecacuanha may be so managed as merely to nauseate, and in this way it has been found useful in certain obstinate diarrhœal and dysenteric affections. It also, under the same circumstances, adds to the activity of purgative medicines, and is occasionally conjoined with them where determination to the surface is also required.

℞ Pulveris Ipecacuanhæ, gr. ij.
Pulveris Jalapæ, gr. x.
Calomelanos, gr. j.
Fiat pulvis vehiculo idoneo sumendus.

Ipecacuanha furnishes us with the only vegetable emetic to be relied upon; evacuating the stomach certainly and completely, without any material consequent debility, and being milder and safer in its operation than the generality of such medicines. The emetic dose of ipecacuanha is from fifteen to twenty grains of the powdered root, in about an ounce of any aromatic water. In ten or fifteen minutes it nauseates, and when retching comes on, and not before, moderate draughts of warm water, or chamomile tea, should be taken to promote its operation, and thoroughly to wash out the contents of the stomach. If the powder be taken in a large quantity of liquid, or if warm water be too copiously swallowed immediately after the emetic, vomiting is apt to come on too rapidly, and the contents of the cardiac portion of the stomach only are thrown off, while the pyloric end escapes the evacuation.

Where an emetic is administered at the commencement of fevers, with a view of blunting their violence, or cutting short their progress, and especially if given upon the accession of the cold stage of an intermittent, a grain of tartarised antimony may be added to fifteen of ipecacuanha; this extends the duration of the nausea and of the vomiting, and tends more decidedly to promote perspiration:—

℞ Antimonii Potassio-tartratis, gr. j.
Pulveris Ipecacuanhæ, gr. xv.
Aquæ Menthæ Viridis, f℥xj.
Syrupi Croci, f℥j.
Fiat haustus emeticus.

Such an emetic is highly proper in the early stage of many diseases, especially at the commencement of inflammatory sore throat, of quinsey, and of laryngeal and tracheal inflammation. It ought to be followed up by a diaphoretic regimen.

Where there is decided fulness of the cerebral vessels, and in cases of hernia, of passive hæmorrhage, and in advanced pregnancy, emetics are obviously contra-indicated.

The operation of an emetic is sometimes followed by suppression of urine. Dr. Heberden mentions the case of a young woman (*Commentaries*), and I have seen another, in which scarcely any urine appeared to be secreted for nearly twenty-four hours after the vomiting.

The following are the formulæ of ipecacuanha in the present *London Pharmacopœia:*—

Vinum Ipecacuanhæ.	Wine of Ipecacuanha.
℞ Ipecacuanhæ contusæ, uncias duas cum semisse,	Take of Ipecacuanha, bruised, two ounces and a-half,
Vini Xerici, octarios duos;	Sherry Wine, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

In the dose of twenty to forty minims, this is an effectual adjunct to expectorants and diaphoretics; as an emetic, it is frequently given to children in the dose of a tea-spoonful every ten minutes till it operates. Dr. A. T. Thomson states that a pint of sherry wine takes up 100 grains (of the soluble matter) of ipecacuanha, "and as the active part of the root, or emetina, is more soluble in acetic acid than any other menstruum, the acescency of the wine is no objection." The acescency of sherry, however, is, or ought to be, dependant upon bitartrate of potassa, and as we are not sufficiently acquainted with the properties of the salts of emetina, an alcoholic tincture of ipecacuanha would, perhaps, have been preferable to the wine.

Pilulæ Ipecacuanhæ Compositæ.	Compound Pills of Ipecacuanha.
℞ Pulveris Ipecacuanhæ compositi, drachmas tres,	Take of Compound Powder of Ipecacuanha, three drachms,
Scillæ recèns exsiccatæ,	Squills, fresh dried,
Ammoniaci, singulorum drachmam,	Ammoniacum, each a drachm,
Misturæ Acaciæ, quantum satis sit;	Mixture of Acacia, as much as may be sufficient;
Simul contunde, donec corpus unum sit.	Beat them together until incorporated.

This is a good diaphoretic and sedative expectorant; ten grains, divided into two or three pills, may be taken at bed-time to allay cough.

Pulvis Ipecacuanhæ Compositus.	Compound Powder of Ipecacuanha.
℞ Ipecacuanhæ contritæ,	Take of Ipecacuanha in powder,
Opii duri contriti, singulorum drachmam,	Hard Opium in powder, of each one drachm,
Potassæ Sulphatis contritæ, unciam;	Sulphate of Potassa, powdered, an ounce;
Misce.	Mix.

A grain of opium is contained in ten grains of this powder. It is an excellent sudorific: it should be given at bed-time in a small quantity of liquid, for it is apt to nauseate if copious drinking be resorted to immediately after its administration. In febrile and rheumatic affections, and in all cases where a sedative diaphoretic is required, its certainty of effect especially recommends it.

The combination of ipecacuanha and opium in the above powder constitutes its activity; the sulphate of potassa is a convenient vehicle. In the original "Dover's Powder," for which this is intended as a substitute, the saline ingredient was obtained by deflagrating nitre with sulphate of potassa; but this formed a deliquescent mixture, and, therefore, less appropriate than the above; nitre is, however, often a proper adjunct.

In the dose of five grains, this powder often proves effective, especially if conjoined with an equal quantity of mercurial pill, where that remedy is not contra-indicated, or with half a grain of calomel. From ten to twenty grains in a common saline draught, is the usual mode of prescribing it where its full powers are wanted; it is, however, less apt to nauseate when given in pills, or in currant jelly, or thick gruel.

IRON, *see* FERRUM.

JALAPA. *Radix.* Jalap; the *root* of the *Ipomœa Jalapa. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Convolvulaceæ.

This plant is a native of the eastern declivity of the Mexican Andes, near Chiconquiaco and near San Salvador, at an elevation of 6000 feet above the level of the sea; also on the mountains near Orizaba.

The root is tuberous and fleshy, with many rounded tubercles. Stem smooth and brownish. Leaves stalked; the first hastate, the succeeding ones cordate, acuminate, mucronate, smooth. Corolla purple, with a long, somewhat clavate tube, and an undulated limb with five plaits. Filaments smooth, unequal, longer than the tube of the corolla; anthers linear, projecting. Stigma capitate, deeply furrowed. Capsule two-celled; cells two-seeded. It appears from Dr. Lindley (*Flora Medica*, 397,) that this is the plant which furnishes the jalap of commerce. The traders, however, consider the root of *Ipomœa Orizabensis* to be extremely similar in quality, and the two are probably mixed. The name *Jalap* is from Xalapa, a city of Mexico.

Jalap was first brought to Europe about the year 1610. The most select comes from Vera Cruz. The root, when fresh, abounds in milky juice. It is imported in irregular globular pieces, and their sections and slices; it should be dense and of a resinous fracture, exhibiting a brownish-gray interior, and a concentric arrangement of its layers. Its odour, especially when in powder, is very characteristic; its taste, exceedingly nauseous, accompanied by a sweetish bitterness. Those pieces which are light, spongy, pale-coloured, worm-eaten, and inodorous, and which do not readily burn in the flame of a candle, should be rejected, as either injured or spurious.

According to Cadet de Gassicourt, 100 parts of dry select jalap root contain—

Resin	10·0
Gummy extractive	44·0
Starch	2·5
Albumen	2·5
Phosphate, muriate, and carbonate of potassa and of lime,	4·5
Water	5·0
Woody fibre	29·0
Colouring matter, sugar, trace of acetic acid, and loss,	2·5

The following are the officinal formulæ of jalap in the *London Pharmacopœia.*

EXTRACTUM JALAPÆ.	EXTRACT OF JALAP.
℞ Jalapæ contritæ, libras duas cum semisse, Spiritûs rectificati, congium, Aquæ destillatæ, congios duos;	Take of Jalap, in powder, two pounds and a-half, Rectified Spirit, a gallon, Distilled Water, two gallons;
Macera jalapæ radicem in spiritu per quatriduum, et tincturam effunde. Residuum ex aquâ decoque ad congium dimidium. Dein tincturam, et decoctum separatim cola; hoc consumatur, illa destillet, donec utrumque spissescat. Postremò, extractum resinâ misce, et ad idoneam crassitudinem consume.	Macerate the jalap root in the spirit for four days, and pour off the tincture. Boil down the residue in the water to half a gallon. Then strain the tincture and the decoction separately; let the latter be evaporated and the former distilled until each thickens. Lastly, mix the extract with the resin, and evaporate to a proper consistence.
Servetur hoc extractum *molle*, quod ad pilulas fingendas aptum sit, et *durum*, quod in pulverem teri possit.	This extract should be kept *soft*, fit to form pills, and *hard*, so that it may be rubbed to powder.

TINCTURA JALAPÆ.	TINCTURE OF JALAP.
℞ Jalapæ contritæ, uncias decem, Spiritûs tenuioris, octarios duos;	Take of Jalap, in powder, ten ounces, Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter

PULVIS JALAPÆ COMPOSITUS.	COMPOUND POWDER OF JALAP.
℞ Jalapæ, uncias tres, Potassæ Bitartratis, uncias sex, Zingiberis, drachmas duas;	Take of Jalap, three ounces, Bitartrate of Potassa, six ounces, Ginger, two drachms;
Separatim in pulverem tere; dein misce.	Rub them separately into powder then mix.

Jalap is one of the most valuable of the drastic purgatives; the best form for administering it is in powder or tincture; the extract is less certain in its effects. In the dose of from five to twenty grains of the powder, it usually produces watery motions, with some gripings, and an increased flow of urine. Where the intestines are to be thoroughly evacuated, it may be united with other remedies of the same class, as with calomel, scammony, senna, &c.

℞ Pulveris Jalapæ, gr. xv. Hydrargyr. Chloridi, gr. iij. M. fiat pulvis e vehiculo idoneo sumendus.	℞ Pulver. Jalapæ, ℈j. Infusi Sennæ c. f℥j. Tinctur. Sennæ, fʒj. M. fiat haustus purgans.

These are effectual purges; the latter especially for evacuating the bowels of boys who have over-eaten themselves; they sometimes nauseate and vomit, but enough usually remains behind to purge also.

As a diuretic, the qualities of jalap are much increased by combining it with bitartrate of potassa; hence, in such cases, the use of the *Pulvis Jalapæ Compositus*, given in the dose of from fifteen to forty grains; and an electuary composed as follows, it is also a good diuretic purge:—

℞ Confectionis Sennæ, ℥ij.
Pulver. Jalapæ, ʒj.
Potass. Supertart. Pulv. ℥ss.
Syrup. Zingiber. ℥j.
M. sumat cochl. j. min. bis vel ter die.

Or the following draught may be taken two or three times a day:—

℞ Tincturæ Jalapæ, fʒij.
Aceti Scillæ, fʒj.
Aquæ Menthæ Viridis, fʒx.
Misce. Fiat haustus.

Tincture of jalap is often used for the purpose of increasing the operation of other purgatives, but it sometimes nauseates. The extract, which is obtained by the above formula in the proportion of about 66 *per cent.* (16 of alcoholic, and 50 of aqueous extract) is an active purgative, but when given in the form of pills, it is apt to gripe: triturated with almonds and sugar, or with mucilage, this effect is generally prevented, and it then operates freely and without pain. The dose for an adult is from five to fifteen grains.

Search has been made at different times for the active principle of jalap, but nothing of an alkaline character has been detected in it; it appears, however, from the experiments of Buchner and Herberger, (*Rep. für die Pharm.*, XXXVI.) that its purgative power resides in the *resin*, which is separable by the action of ether into two distinct forms of resinous matter, which are to each other in the relation of acid and base. The basic resin they have termed *Jalapine*, and to it they ascribe the activity of the root.

The action of jalap as a poison has been partially examined by Cadet de Gassicourt; according to whom, it produces no effect on dogs, when injected into the jugular vein, in the quantity of twenty-four grains, or when applied to the cellular tissue. When duly rubbed, however, for a few days, upon the skin of the belly and thighs, it excited severe dysentery; introduced into the pleura and peritonæum, it produced fatal pleurisy, and peritonitis accompanied by dysentery; and when introduced into the stomach or anus, the animals died under profuse purging, in the course of four or five days, and the stomach and intestines were found inflamed, and in some cases, ulcerated.

JUJUBES. The fruit of the *Zizyphus Jujuba.* (*Nat. Ord.* Rhamnaceæ). This is a small prickly tree, common in China and various parts of the East Indies. Its fruit is pleasantly acid and mucilaginous, and furnishes the pectoral lozenges known under the name of *pâte de jujube:* the article, however, sold as such in London, is little else than gum arabic and sugar coloured red.

JUNIPERI CACUMINA ET FRUCTUS. The *tops* and *fruit* (berries) of the *Juniperus communis. Cl.* 22. *Ord.* 13. Diœcia Monadelphia. *Nat. Ord.* Coniferæ or Pinaceæ.

The juniper is an indigenous shrub in Europe, the North of Asia, and North America. Tips of the branches smooth and angular; leaves in threes, linear-acerose, sharply mucronate, shining green on their lower surface, but with a broad glaucous line through the centre of the upper; they always resupinate, and turn their upper surface towards the ground. Barren flowers in small axillary aments, with roundish acute stipitate scales, including several anthers. Fertile flowers on a separate shrub, having a small three-parted involucre growing to the scales, which are three in number. Fruit fleshy, roundish oblong, berried, of a dark-purplish colour, formed of the confluent succulent scales, marked with three prominences or vesicles at top, and containing three seeds; it requires two seasons to arrive at maturity (*Lindley*).

The juniper tops might have been omitted in the list of the Materia Medica; they furnish an infusion which is diuretic and sudorific, but they are not always to be had fresh, and are altogether unimportant.

The fruit, or juniper-berries, are principally imported from Italy, Germany, and Holland. The Italian berries are large and plump, but not in general so abundant in oil as the others. Their taste is sweet and mucilaginous, and when chewed warm and aromatic. They contain, according to Tromsdorf,—

Volatile oil and wax	5·0
Resin	10·0
Saccharine matter with acetate of lime,	33·8
Gum and vegetable salts . . .	7·0
Fibre	35·2
Water	9·0
	100·0

The medical virtues of juniper berries reside exclusively in their volatile oil, which has a place among the *Olea Destillata* of the Pharmacopœia.

Oil of Juniper has a fragrant and terebinthinate odour. It is largely imported from Italy, but the foreign oil is never so fragrant as that which is drawn in this country. It is of a greenish yellow colour, and soluble in alcohol. Its specific gravity varies from ·868 to ·883, the English oil being generally the less dense. The flavour of *genuine Hollands* is derived from the distillation of the spirit off juniper berries, or with the oil; common gin was generally flavoured by turpentine, but the consumers of that pernicious compound have of late become more nice than formerly, and juniper berries and oil are therefore employed in its manufacture.

In the dose of two or three drops, added to pills, or triturated with sugar, oil of juniper is diuretic, and often powerfully so, especially in conjunction with other remedies of that class. In the treatment of anasarca, therefore, and of ascites, infusions of juniper berries, with the occasional addition of the compound spirit and of the oil, are frequently prescribed as adjuncts to squills and digitalis. A decoction of the berries has also been recommended as an alterative diet-drink in some cutaneous affections, and as a lotion for the hands in scabies.

Spiritus Juniperi Compositus.	Compound Spirit of Juniper.
℞ Juniperi Fructûs contusi, uncias quindecim,	Take of Juniper Berries bruised, fifteen ounces,
Carui contusi,	Caraways bruised,
Fœniculi contusi, singulorum uncias duas,	Fennel Seed bruised, of each two ounces,
Spiritûs tenuioris, congium,	Proof Spirit, a gallon,
Aquæ, octarios duos;	Water, two pints;
Misce; tum lento igne destillet congius.	Mix; then with a slow fire let a gallon distil.

This is to some persons a very agreeable substitute for Hollands, and hence, when sweetened, is used as a *liqueur*. It is an unimportant diuretic; its only use being as an occasional adjunct to other diuretic combinations.

The following are diuretic formulæ for dropsical affections, of which juniper forms a part:—

℞ Scillæ Rad. Pulv. gr. ij.
Pulv. Foliorum Digitalis, gr. j.
Pilulæ Hydrargyri, gr. vj.
Olibani Pulver. ℈ss.
Olei Juniperi, ♏iv.
Fiat massa in pilulas quatuor dividenda, è quibus capiat ij. hora somni, superbibendo haustulum misturæ sequentis.

℞ Baccarum Juniperi contus. ℥ij.
Carui Semin. contus. ʒij.
Aquæ ferventis, oct. j.
Macera per horas tres et cola.

℞ Colaturæ, f℥xij.
Spiritûs Juniperi compositi, f℥ij.
Potassæ Nitras, ℈ij
Syrupi Scillæ, f℥ss.
Fiant mistura, de qua sumatur cyathus cum pilulis et subinde.

KINO. *Extractum.* The *extract* of the *Pterocarpus erinaceus. Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Leguminosæ.

The extract of the bark of the *Eucalyptus resinifera* of New Holland, and of the *Coccoloba uvifera*, or Sea-side grape, of the West Indian Islands and adjoining coast of America, appear to have borne the name of kino, and probably occur in commerce as such; but the genuine kino is stated to be the indurated exudation of the broken or wounded branches of the above species of Pterocarpus; it is a tree from forty to fifty feet in height. Leaves unequally pinnate, smooth above, downy beneath; leaflets eleven to fifteen, alternate, distant, on short stalks, ovate-oblong, obtuse or emarginate, wavy at the edge; stipules lanceolate, villous, deciduous. Racemes solitary or clustered, downy, from the old wood, below the young branches, much shorter than the leaves. Flowers yellow. Legume stipitate, compressed, membranous, velvety, sinuated and undulated, prickly on the centre.

Kino usually occurs in small fragments, having a brilliant fracture, and a reddish-brown colour. It is slightly sweet, and very astringent when chewed. Water at 60° dissolves about half of it, and alcohol nearly two-thirds; the latter solution having a rich brown colour; there is, however, an article termed kino, which is tasteless and nearly insoluble, and with which the genuine drug is frequently mixed: this is supposed to be African kino. The leading components of kino appear to be tan, and a difficultly soluble extractive matter, probably united with a portion of gum and resin.

According to Vauquelin, 100 parts of African kino contain—

Tan and extractive	75
Red gum	24
Insoluble matter	1
	100

The following are the officinal formulæ of kino:—

Tinctura Kino.	Tincture of Kino.
℞ Kino contriti, uncias tres cum semisse,	Take of Kino, in powder, three ounces and a-half,
Spiritûs rectificati, octarios duos;	Rectified Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

The dose of this tincture is from half a drachm to two drachms, as an adjunct to other astringents. It sometimes becomes gelatinous on keeping, which is said to arise from the use of the kino of the Eucalyptus.

Pulvis Kino Compositus.	Compound Powder of Kino.
℞ Kino, drachmas quindecim,	Take of Kino, fifteen drachms,
Cinnamomi, unciam dimidiam,	Cinnamon, half an ounce,
Opii duri, drachmam;	Hard Opium, a drachm;
Separatim in pulverem subtilissimum tere; dein misce.	Rub them separately into a very fine powder; then mix them.

Twenty grains of this powder contain one grain of opium. It is useful in allaying diarrhœa, and is a form of opium which sometimes agrees better than others with the stomach. The dose is from five to twenty grains in chalk mixture, or other convenient vehicle.

The use of kino in pharmacy is exclusively as an astringent, and it is given in any proper vehicle, in doses of from ten to thirty grains, two or three times a day; it is, however, not more effective than catechu, and liable to vary in its composition; so that it is sparingly employed.

Speaking of the uses of opium, with astringents, in the treatment of pyrosis, Dr. Pemberton observes, that kino is generally to be preferred, because, unless there is diarrhœa present, it appears to have no tendency to confine the bowels. "In this drug," therefore, he adds, "you have a medicine, which exerts its powers to restrain the discharge of the glands when they are secreting too much, without exerting any such powers over the glands when they are acting naturally." And again, he remarks, "that it is not difficult to conceive that an astringent shall be able to contract a vessel, already too much relaxed, to its natural standard; but that the same astringent shall be unable to contract it further. If this be allowed, we have the advantage of possessing an agent which shall restrain the unnatural secretion of a gland, but which shall cease to act when this purpose is obtained. Whether such be the true method of accounting for this peculiarity, or whether it may arise from the insolubility of kino, except in a quantity of fluid, I do not pretend to determine; but I can with confidence assert, that the effect of kino will be found such as I have above stated." (*On the Diseases of the Abdominal Viscera.*)

The greater number of the purer vegetable astringents, however, possess this character; and under the ordinary circumstances of a healthy state of stomach and bowels, their tendency is not to constipate: indeed, in their capacity of tonics, they often relieve habitual costiveness, apparently by increasing the muscular power of the alimentary canal.

Kino has been applied externally as a styptic, and to diminish the discharge of ill-conditioned ulcers.

KRAMERIA. *Radix.* Rhatany Root. The *root* of the *Krameria triandra.* *Cl.* 4. *Ord.* 1. Tetrandria Monogynia. *Nat. Ord.* Polygalaceæ (Krameriaceæ?).

This suffruticose plant inhabits the dry sandy and gravelly soils of Peru, and flowers all the year round. Its root is horizontal, long, and branched, with a thick reddish-brown bark, stem procumbent, much branched, taper. Branches two to three feet long; silky when young; leaves alternate, sessile, oblong and obovate, acuminate, entire, hoary on each side; flowers solitary, axillary, stalked; calyx silky externally, smooth and shining inside, of the colour of lac; two upper petals separate, spatulate; two lateral, roundish, concave; drupe dry, hairy, burred with dull red hooks (*Lindley*).

Krameria, or, as it is commonly called, *rhatany root*, abounds in astringent matter. Peschier found in it a peculiar crystallisable acid, which he calls *krameric acid.* According to Vogel, its constituents are, 40·00 of a peculiar red astringent principle; 1·50 mucilage; 0·50 starch; 48·00 woody fibre; 10·00 water (and loss).

In Peru it is used as a tooth-powder, and internally as a tonic. In this country it is stated to have been long employed by the manufacturers of port wine, and that large quantities of its extract are prepared solely for that purpose in South America. As a medicine, it is not much used, though no doubt a very effective astringent tonic. According to Dr. A. T. Thomson, it has been found serviceable "in chronic rheumatism, in gastrodynia attended by dyspepsia, headache, and vertigo, and in all diseases of the digestive organs in which the powers of the stomach are impaired. When there is great debility of the nervous system it operates as powerfully and more immediately than the cinchona bark, whilst in cases of general asthenia its invigorating effects are very evident." An *infusion* is the only formula of the root in the *London Pharmacopœia.* A good preparation is the *compound tincture*, made by digesting four ounces of the powdered root, and two ounces of dried orange-peel, bruised, in two pints of proof spirit, for fourteen days.

INFUSUM KRAMERIÆ.	INFUSION OF RHATANY ROOT.
℞ Krameriæ, unciam,	Take of Rhatany Root, (finely bruised,) an ounce;
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas quatuor, in vase levitèr clauso, et cola.	Macerate for four hours in a lightly-covered vessel, and strain.

LACMUS. *Thallus preparatus.* The *prepared thallus* of the *Rocella tinctoria.* *Nat. Ord.* Lichenes.

This lichen, after having been cleaned, dried, and powdered, is mixed with pearlash and moistened with urine, when a species of fermentation ensues, which is kept up till the material becomes a blue pulp; it is then mixed with a certain quantity of chalk and potash, and dried. In this state it constitutes the *litmus*, or *archil* of commerce. It is chiefly used by silk dyers. It furnishes, with water and alcohol, a beautiful violet-coloured tincture, which is reddened by acids, and the blue colour is again restored by alkalis. It probably has a place in the Materia Medica merely from its use as a test, for neither the original lichen, nor the litmus prepared from it, are employed in medicine.

LACTUCARIUM. *Succus spissatus.* The *inspissated juice* of the *Lactuca sativa.* *Cl.* 19. *Ord.* 1. Syngenesia Æqualis. *Nat. Ord.* Cichoraceæ.

This species of lettuce is abundantly cultivated for culinary use. It has a fibrous root, and a corymbose stem from two to three feet in height. Its general characters are well known. When in flower its juice becomes milky on exposure to air, and when dried in the sun acquires a brown colour. In this state it has been used as an anodyne and narcotic, under the name of *Thrydace* and *Lactucarium.* Its taste and smell are slightly those of opium, but it has not been shown to contain morphia. The drowsiness occasioned by eating lettuce has been frequently noticed; it is one of the least indigestible of raw vegetables, and is often taken with impunity by persons with irritable and dyspeptic stomachs. In such cases small doses of opium are frequently effectual in promoting digestion, and it is possible, as Dr. W. Philip has suggested, that this peculiarity of raw lettuce may be referable to its anodyne powers. Lactucarium may be tried as a sedative where opium cannot, from various causes, be exhibited. Dr. Duncan considers it well adapted for allaying cough in phthisis. It is generally given in pills, the dose being from one to six or eight grains. A tincture is sometimes prepared by digesting one ounce of lactucarium in a pint of proof spirit; from ten minims to one drachm is the dose.

LAUDANUM (from *Laudo*, in consequence of the *praises* bestowed upon it). A compound tincture of opium, stronger generally than that of the Pharmacopœia, and containing spices and saffron. (*See* OPIUM).

LAURI BACCÆ ET FOLIA. The *berries* and *leaves* of the *Laurus nobilis. Cl.* 9. *Ord.* 1. Enneandria Monogynia. *Nat. Ord.* Lauraceæ.

The bay-tree is a native of the South of Europe; it is an evergreen, from fifteen to twenty-five feet high; the branches are smooth, green, and leafy, with an aromatic and bitterish bark. Leaves alternate, lanceolate, wavy at the edge, and smooth; umbels four to six-flowered, somewhat globose, in small axillary clusters enclosed in papery, roundish, concave scales. Flowers yellowish-white, glandular, dotted, and membranous. The fruit is of the size of a large pea, ovate, black, covered with a succulent coat.

There is nothing either in bay-berries or bay-leaves that justifies their retention in the *London Pharmacopœia.* The components of the berries are, according to Bonastre—

Volatile oil and camphor	1·8
Fixed oil and wax	19·9
Resin	1·6
Starch and mucilage	49·5
Saccharine and saline matter	1·7
Fibre	18·8
Moisture	6·4
A trace of acid and loss	·3
	100

LAVANDULA. *Flores.* Lavender Flowers. The flowers of *Lavandula spica. Cl.* 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. Ord.* Labiatæ, or Lamiaceæ.

The *Lavandula spica* is the shrub called *French lavender.* It yields a fragrant essential oil, largely employed as a vehicle for colours in porcelain painting, and in the preparation of varnishes, and generally known in trade under the name of *oil of spike.* The officinal species is the *Lavandula vera*, or *common lavender;* it is a shrub two or three feet high, perennial, and a native of the South of Europe; it is largely cultivated on account of its flowers, which it bears in June and July. Its leaves are oblong-linear, or lanceolate, entire when young, hoary and revolute at the edges. Spikes interrupted. Whorls of six to ten flowers. Floral leaves rhomboid, ovate, acuminate, membranous, all fertile, the uppermost shorter than the calyx. Bracts scarcely any.

Lavender flowers are rather to be regarded as a perfume than a medicine. The essential oil, which ought also to have had a place in the list of the Materia Medica, is obtained by distilling these flowers with water, in the proportion of about one pound from fifty to seventy pounds of the flowers; it is extremely fragrant; and, dissolved in alcohol, constitutes one of our most agreeable perfumes. In point of fragrance, none of the foreign oil of lavender comes into competition with that distilled in

England; and the plant is abundantly cultivated in the vicinity of London for that purpose. The oil which passes first over has the highest and most perfect scent, and is frequently kept separate, and sold at a proportionate price. When the stalks and leaves are distilled with the flowers, the odour of the oil is considerably deteriorated, and this appears generally to be the case with the foreign oil.

Spiritus Lavandulæ.	Spirit of Lavender.
℞ Lavandulæ recentis, libras duas cum semisse,	Take of fresh Lavender Flowers, two pounds and a-half,
Spiritûs rectificati, congium,	Rectified Spirit, a gallon,
Aquæ, octorios duos;	Water, two pints;
Misce; tum lento igne destillet congius.	Mix; then, by a gentle fire, let a gallon distil.

This preparation forms a part of the next formula, and of the *Linimentum Camphoræ compositum* (page 143), in both of which oil of lavender might have been substituted; nor is it necessary to use recent flowers, as above directed, for those which are dried yield an equally fragrant product. This preparation may be substituted for rectified spirit in lotions and other cases, where we wish to avail ourselves of the perfume.

Lavender water, as generally prepared, is not a distilled spirit, but an alcoholic solution of oil of lavender, to which other scents are occasionally added. Each manufacturer has generally his own recipe, so that here we can only give one of the most approved as a sample:—

Take of Rectified Spirit of Wine, five gallons,
Essential Oil of Lavender, twenty ounces,
Essential Oil of Bergamotte, five ounces,
Essence of Ambergris, half an ounce.
Mix.

Four ounces of powdered orris root are sometimes digested in the above, to soften and improve its flavour, which also is materially ameliorated by keeping. The *essence of ambergris*, which forms one of the ingredients, is prepared by digesting one drachm of ambergris, and eight grains of musk, in a pint of rectified spirit.

As an addition to spirit of lavender and other scents, the Parisian perfumers frequently use the following *Tinctura Regia* of the old *Paris Pharmacopœia*, which was also employed as a cordial and antispasmodic:

℞ Ambræ Griseæ veræ, ℈ij.
Moschi, ℈j.
Zibethi, gr. x.
Olei Ess. Cinnamomi, gutt. vj.
Olei Ess. Ligni Rhodii, gutt. iv.
Spiritûs Vini odore florum Rosæ et
Aurantii impregnati, ℥ivss.
Solvatur ambra leniter ebulliendo in hôc spiritu, et deinceps volatiliora addantur. Dosis, gutt. x. ad xxx. è vino.
Hæc tinctura, parcâ quantitate rebus odoratis adstillatâ, illarum aroma mirè exaltat.

Tinctura Lavandulæ Composita.	Compound Tincture of Lavender.
℞ Spiritûs Lavandulæ, octarium cum semisse,	Take of Spirit of Lavender, a pint and a-half,
Spiritûs Rosmarini, octarium dimidium,	Spirit of Rosemary, half a pint,
Cinnamomi contusi,	Cinnamon, bruised,
Myristicæ contusæ, singulorum drachmas duas cum semisse,	Nutmegs, bruised, of each, two drachms and a-half,
Pterocarpi concisi, drachmas quinque;	Red Saunders, sliced, five drachms;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

This tincture, commonly called *lavender drops*, is a convenient restorative in languors, spasms, and flatulency; a teaspoonful may be taken in a wine-glass full of camphor julap, or dropped upon a lump of sugar; it is sometimes added to purgatives and to saline aperients, to render them more agreeable and to prevent griping.

LEAD, *see* Plumbum.

LEECH, *see* Hirudo.

LICHEN, *see* Cetraria.

LIME, *see* Calcium.

LIMONES. *Fructus.* The *fruit* of the *Citrus Limonum.* *Cl.* 18. *Ord.* 3. Polyadelphia Icosandria. *Nat. Ord.* Aurantiaceæ.

The lemon, like the orange-tree, is found in a wild state in the northern parts of India, and in China. It is cultivated in Spain, Portugal, and France, and is common in our conservatories: it is evergreen; it sends off numerous branches; the leaves are smooth and pale green, alternate, ovate, acuminal, about four inches long and two broad, slightly indented at the edges, and supported on naked linear footstalks. The flowers, which appear the greater part of the summer, are odoriferous, large, and placed on simple and branched peduncles arising from the smaller branches. The calyx is saucer-shaped, with the teeth pointed; the petals are oblong, concave, white, purplish outside; the filaments, united at their base into four parcels, support yellow vertical anthers; the germen is superior, roundish, and having a simple style with a globular stigma. The fruit is ovate, very uneven, with a pale yellow rind, the exterior of which abounds in vesicles containing oil. The pulp is juicy and very acid; it consists of irregular bags, which are cellular extensions of the sides of the carpels.

Citric acid (which see) is the source of the acidity of this fruit. Its aroma depends upon the peculiar essential oil (*citrene*) contained in the cells of the rind, and which has a place in the Materia Medica under the name of *Oleum Limonum.* According to Mr. Phillips, fresh lemon juice, of the specific gravity of 1044, is almost precisely equal in strength to distilled vinegar of the specific gravity 1009, since two parts of the former are saturated by 14·8 grains of carbonate of soda, and the same quantity of the latter by 14·5 grains. He also states that a pint of lemon-juice weighing fifteen ounces and six drachms and a half, decomposes a few grains more than six drachms of chalk; these proportions apply to lemon-juice of average strength; but its saturating power varies considerably with the state of the fruit; and when it has fermented, its saturating power remaining the same, its proportion of *citric* acid is often diminished.

The essential oil of the external rind of the lemon is largely prepared in Italy and other parts of the South of Europe. Its chief use is as a perfume; it is a good addition to sulphurous and other disagreeably smelling ointments. Its flavour is much less agreeable than that of lemon-peel, for which, therefore, it cannot be substituted. It often tastes and smells so strongly of turpentine, as to lead to a suspicion of adulteration with that oil.

Lemon juice is employed in medicine, chiefly in the preparation of lemonade and similar cooling drinks; and, saturated with potassa, in saline draughts. Sometimes ammonia is used, citrate of ammonia being probably somewhat more diaphoretic than citrate of potassa; but these compounds are nearly inert in themselves, though elegant vehicles for diaphoretics and expectorants. The following are the usual prescriptions for saline draughts:—

℞ Potassæ Carbonatis, ℈j.
Succi Limonum recentis, f℥ss. vel q. s.
Aquæ, f℥j.
Spirit. Myristicæ,
Syrupi, āā fʒj. M.

℞ Ammoniæ Sesquicarbonatis, ℈j.
Succi Limonum recent. fʒvj. vel q. s.
Misturæ Camphoræ, fʒvj.
Syrup. Tolutani, fʒss. M.

Vomiting is sometimes relieved by a saline draught in the act of effervescence, or, in other words, by the effect of the evolved carbonic acid gas upon the stomach; in this case the following formula is used, in which bicarbonate of potassa is substituted for the carbonate.

℞ Potassæ Bicarbonatis, gr. xxiv.
Aquæ, f℥j.
Syrupi Aurant.
Tinctur. Cardam. compos. āā fʒj.
M. fiat haustus in actu effervescentiæ sumendus cum succi limonum recentis f℥ss.

In these formulæ fresh lemon-juice is more agreeable than solution of citric acid, but the latter may often be substituted, especially in the effervescing draught.

The following table of the equivalent proportions of concrete citric acid, and of lemon-juice, necessary to neutralise the carbonates of potassa and of ammonia, is from Dr. Paris's *Pharmacologia:*—

Citric Acid.	Lemon Juice.	A Scruple of the Alkalis.
grs. x.	fʒiij.	Bicarbonate of Potassa.
grs. xv.	fʒiv.	Carbonate of Potass.
grs. xxv.	fʒvij.	Sesquicarbonate of Ammonia.

The following are good proportions of the ingredients of lemonade:—

Fresh Lemon Juice, four ounces.
Fresh and very thin Peel of Lemon, half an ounce.
White Sugar, four ounces.
Water, three pints.

The water should be poured boiling upon the other ingredients, in a covered vessel, and strained off when cold: it may then be iced if necessary. A drachm of nitre is sometimes a good addition to the above, when it is used as common drink in fevers.

The beverage known under the name of *King's Cup*, is also a good diluent, and often used at the table and in the sick room. It is made by pouring a quart of cold spring water upon the rind of one or two lemons, *peeled very thin*, and leaving it to infuse for six or eight hours; it is then poured off, and should be bright and pale yellow.

"On account of its antiseptic powers, lemon juice is successfully used in sea scurvy, and for this purpose, large quantities of it, in a concentrated state, are distributed in the navy; but the continued use of it is said to be hurtful to the general health of the men, and to hasten the progress of phthisis, where it makes its appearance." (*Lond. Disp.*) Sir Gilbert Blane states that solution of crystallised citric acid is not an effective substitute for lemon-juice in cases of scurvy.

LINIMENTS. (Lino, *I besmear.*) External applications, to be smeared or rubbed upon the part affected. They are generally of a stimulating character, and intended to promote absorption, or excite counter-irritation. The following are the officinal *Liniments* of the present *London Pharmacopœia*:—

Linimentum Æruginis	Liniment of Verdigris.
Linimentum Ammoniæ . . .	Liniment of Ammonia.
Linimentum Ammoniæ Sesquicarbonatis	Liniment of Sesquicarbonate of Ammonia.
Linimentum Camphoræ . . .	Liniment of Camphor.
Linimentum Camphoræ Compositum .	Liniment of Camphor (compound).
Linimentum Hydrargyri Compositum	Liniment of Mercury (compound).
Linimentum Opii	Liniment of Opium.
Linimentum Saponis	Liniment of Soap.
Linimentum Terebinthinæ . . .	Liniment of Turpentine.

LINI SEMINA. The *seeds* of the *Linum usitatissimum*. *Cl.* 5. *Ord.* 5. Pentandria Pentagynia. *Nat. Ord.* Linaceæ.

The common flax plant is an indigenous annual; its stalk is erect, round, smooth, branched towards the top, and about a foot and half high; the branches are simple, alternate, and terminated by the flowers, which are solitary, and of a sky-blue colour; the leaves are lanceolate, acute, sessile, smooth, glaucous, vertical, and alternately scattered over the stalk and branches; the calyx is divided into five semilanceolate segments, pointed and fringed with hairs; the corolla is funnel-shaped, consisting of five petals, which are large, obovate, striated, and minutely scolloped at the extremities; the five filaments are tapering, erect, about the length of the calyx, united at the base, and crowned with simple anthers; the germen is oval; the five styles are filiform, erect, of the length of the filaments, and furnished with blunt stigmata; the capsule is globular, five-valved, and ten-celled; the seeds are shining, solitary, flattish, and oval.

Meyer obtained from 100 parts of linseed—

Fixed oil	11·27
Wax	0·15
Resin and colouring matter	2·90
Mucilage, a trace of acetic acid, and acetic, sulphuric, phosphoric, and muriatic salts	16·12
Astringent and yellow extractive	1·91
Sweet extractive, with malic acid and malates	10·88
Gum, with lime	6·15
Starch	1·48
Albumen	2·78
Gluten	2·93
Husks and emulsin	43·43
	100

The mucilage of linseed is extracted by hot water, and forms the basis of *linseed tea*, and of the following infusion, which furnishes a cheap and useful demulcent:—

Infusum Lini Compositum.	Compound Infusion of Linseed.
℞ Lini Seminum contusorum, drachmas sex,	Take of Linseed, bruised, six drachms,
Glycyrrhizæ concisæ, drachmas duas,	Liquorice, sliced, two drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas quatuor, propè ignem, in vase levitèr clauso, et cola.	Macerate for four hours, near the fire, in a lightly-covered vessel, and strain.

For the purposes of pharmacy, *linseed oil* is generally employed as met with in commerce, the seeds having been heated previous to expression. When *cold drawn*, it has little taste, and a pale yellow-green colour, but soon becomes rancid, and more disagreeable than that expressed at a higher temperature; from eighteen to twenty pounds of oil are obtained by cold expression from one hundred weight of the bruised seed. Linseed oil is gently aperient, but rarely used on account of its unpleasant flavour. As an external application, it is employed in burns and scalds, sometimes mixed with lime water, or with oil of turpentine. The following is the *Linimentum Oleosum* of the London hospitals, applicable in such cases:—

℞ Olei Lini, f℥iss.
Liquoris Calcis, f℥iij. M.

But the following, which is Mr. Kentish's liniment, is preferable:—

℞ Olei Lini, f℥iv.
Olei Terebinthinæ, f℥ij.
Misce. Fiant linimentum partibus affectis applicandum.

It is important, in extensive burns or scalds, to apply a remedy of this kind immediately upon the occurrence of the accident; much pain is thus prevented, and the extent of the subsequent vesication is generally much diminished, and the cure proportionately accelerated. If, on such occasions, oil of turpentine cannot be procured, gin, rum, or brandy, should be substituted.

Linseed oil is a good addition to poultices, and upon the same principle *linseed meal* is employed; but the latter is usually the powdered cake from which the oil has been expressed, and is an inferior article to powdered linseed, the greasiness of which contributes to the permanent softness required in a mollifying poultice.

Cataplasma Lini.	Cataplasm of Linseed.
℞ Aquæ ferventis, octarium, Lini Seminum contritorum, quod satis sit, ut idonea fiat crassitudo;	Take of boiling Water, a pint, Powdered Linseed, as much as may be sufficient to produce a proper consistency;
Misce.	Mix them.

LITHONTRIPTICS (*λιθος, a stone*, and *τριβεὶν, to rub down*). Medicines supposed to dissolve stone in the bladder. When a stone has once become lodged in the bladder, we have no evidence of any successful means of dissolving it, or even of lessening its bulk by the action of solvents; but there are certain remedies which, when properly administered, may not only alleviate the symptoms, but prevent, by their influence over the secretion of urine, the tendency to the formation of urinary deposits, and, consequently, the increase in bulk of the nucleus in the bladder. These remedies, however, when carelessly or injudiciously exhibited, are often productive of much mischief: their individual applications are stated under other heads. Lithontriptics are of three kinds:—1. *Acids*, which are calculated for cases of white sand, in which phosphate of lime, and the ammonio-magnesian phosphate, predominate, constituting what has been termed the *phosphatic diathesis.* 2. *Alkalis*, which are indicated in cases of *uric diathesis*, or where the urine contains excess of uric acid. 3. *Diluents*, and *diuretics*, which are often applicable to both the preceding, and to other morbid conditions of the urine.

LOBELIA. Indian Tobacco. *Lobelia inflata. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Lobeliaceæ.

This is an annual found in fields and on the road sides in the United States of America. In flowers from July to October. Root fibrous, stem solitary, erect, angular, hairy, and much branched in the full-grown plant; leaves scattered, sessile, ovate, serrate, and hairy; the flowers are in terminal racemes, axillary, and supported on short pedicles; the segments of the calyx are linear and pointed; the corolla has a labiate border, the upper lip bifid, the lower trifid; the curved tube of the anthers encloses the stigma. Capsule two-celled, turgid, oval, compressed, ten-angled, crowned with the calyx. Seeds numerous, small, oblong, brown.

This plant, when dry, has little odour. When chewed it produces a pungent sensation, which remains long in the fauces, causing salivation and nausea. It yields its properties to water and to alcohol. It is emetic and purgative; but its chief value is in smaller doses, when it is antispasmodic, expectorant, diuretic, and diaphoretic. It was first brought into notice by the Rev. Dr. Cutler, of Massachusetts, who used it for the relief of asthma; for ten years he had tried most of the usual remedies with little benefit: he took a saturated tincture of lobelia, in doses of a tablespoonful, which soon produced an abatement of the paroxysm. It has been recommended also by Mr. Gordon, in that form of the disease which has been termed *Hay asthma;* it has also been employed in some cases of croup, and in whooping cough, but not with any remarkable success. In the form of enema, it produces the same effects as tobacco.

Lobelia is administered in powder, in infusion, and in tincture; the dose of the powder is from four to twenty grains. The infusion may be made of one ounce of the plant to one pint of boiling water; of this, an ounce may be taken every half hour till it nauseates. The tincture is made with four ounces of the dried herb to one quart of proof spirit; from fifteen minims to about thirty is the common dose, but in urgent cases it has been given in larger quantity; two drachms namely, to half an ounce. Care should be taken not to push the dose beyond slight nauseation.

LUPULUS. *Strobili exsiccati.* Hops. The *dried strobiles* of the *Humulus Lupulus.* *Cl.* 22. *Ord.* 5. Diœcia Pentandria. *Nat. Ord.* Urticaceæ.

The hop is an indigenous perennial, largely cultivated in this country for the use of the brewer. The strobiles are usually picked in September, and carefully dried in a peculiarly constructed kiln, or oast-house, during which process they lose about three-fourths in weight, and are slightly bleached by the action of the fumes of burning sulphur.

The root of the hop sends up several angular, flexible stems, which twine round the poles; the leaves are opposite, in pairs, petiolate, heart-shaped, entire, or lobed, and dark-green; the leaves and petioles are scabrous, and at the base of each leaf-stalk are two interfoliaceous, entire, reflected stipules; the flowers are axillary, and furnished with bractes; the male flowers are yellowish-white, in panicles, and dependent; the female flowers, which are on distinct plants, are in solitary strobiles, ovate, pendulous, composed of pale-green membranous scales, tubular, and two-flowered, each containing one round, flat, brown seed.

The fragrancy and bitterness of the hop appears to reside chiefly in a pulverulent substance, which may be separated from them by a sieve, and which has been called *lupulin.* It consists of 36 resin, 12 wax, 11 bitter extract, 5 tannin, 10 extractive matter insoluble in alcohol, 26 insoluble residue. Their effect in covering the nauseous sweetness of wort, and preserving beer, is well known. By many writers on the Materia Medica they are represented as powerfully sedative: it has even been asserted, that lying the head upon a pillow stuffed with hops, quiets the delirium of fever, and assuages the violent agitation of maniacal persons. Upon the whole, the medical virtues of hops have been extolled beyond their merits; if we allow them to be a slightly narcotic bitter, we grant them, perhaps, more than they deserve. As a direct or powerful sedative, they are entitled to no confidence.

The *Extractum Lupuli* of the Pharmacopœia is directed to be prepared in the same way as the *extract of gentian* (page 260). It is a good bitter, but not anodyne. One hundred weight of hops yield about forty pounds of this extract.

TINCTURA LUPULI.	TINCTURE OF HOPS.
℞ Lupuli, uncias sex,	Take of Hops, six ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

This tincture, when carefully prepared with good hops from which the lupulin has not been shaken off, is a useful aromatic bitter. The dose is one or two drachms in an ounce and a-half of water.

MACERATION (Macerare, *to soften by steeping*). The steeping a body in a cold liquid.

MAGNESIA. This, like the other alkaline earths, is the oxide of a metal which has been termed *Magnesium*, and which may be obtained by heating potassium with chloride of magnesium; chloride of potassium is formed, and the magnesium set free in its metallic state. It was discovered by Bussey in 1830, though its existence had been anticipated by Davy. Magnesium is a hard, white metal, malleable, and not acted on by water. Heated in the air, or in oxygen, it burns vividly into *magnesia*. It appears to be fusible at about the same temperature as that at which silver fuses. It is oxydized by the dilute acids. Its equivalent upon the hydrogen scale may be considered as =12. Magnesia is its only oxide; it consists, therefore, of—

	Atoms.	Equivalents.	Per Cent.
Magnesium	1	12	60
Oxygen	1	8	40
Magnesia	1	20	100

MAGNESIA.	MAGNESIA.
℞ Magnesiæ Carbonatis, uncias quatuor;	Take of Carbonate of Magnesia, four ounces;
Igne acri ure per horas duas.	Burn it for two hours in a strong fire.
NOTA.	NOTE.
MAGNESIA. Acido hydrochlorico sine effervescentiâ liquatur. Nihil ex hoc liquore adjectâ vel potassæ bicarbonate, vel barii chlorido, demittitur. Curcumæ colorem in fuscum levitèr mutat.	MAGNESIA. It is dissolved by hydrochloric acid without effervescence. Neither bicarbonate of potassa nor chloride of barium throw down anything from this solution. It slightly changes the colour of turmeric to brown.

These tests indicate the absence of carbonic acid, of lime, and of sulphuric acid. In the above process, the carbonate of magnesia loses carbonic acid and water to the joint amount generally of 50 to 60 per cent. The heat should not be raised to whiteness, for in that case the magnesia is apt to become lumpy. Care should be taken that no dust or cinders fall into the crucible; and it is generally right to pass the magnesia through a fine sieve after its calcination. Attention should also be paid to the original purity of the carbonate, especially to its freedom from lime, which it sometimes contains in small quantities, and which gives an acrimony and alkaline flavour to the magnesia not naturally belonging to it.

Magnesia may be called insoluble in water; when moistened upon turmeric paper it slightly reddens it; but water filtered through magnesia has no effect upon the most delicate vegetable colours. When long exposed to the atmosphere, it slowly reabsorbs moisture and carbonic acid.

Magnesiæ Carbonas.	Carbonate of Magnesia.
℞ Magnesiæ Sulphatis, libras quatuor, Sodæ Carbonatis, libras quatuor et uncias octo, Aquæ destillatæ, congios quatuor;	Take of Sulphate of Magnesia, four pounds, Carbonate of Soda, four pounds and eight ounces, Distilled Water, four gallons;
Sodæ carbonatem et magnesiæ sulphatem in aquæ congiis duobus separatim liqua, et cola: dein liquores misce, et coque, spathâ assiduè movens, per quartam horæ partem; denique liquore effuso pulverem demissum aquâ destillatâ fervente lava, et exsicca.	Dissolve the carbonate of soda and the sulphate of magnesia, each separately, in two gallons of water, and filter; then mix the solutions, and boil, assiduously stirring them with a spatula for a quarter of an hour; lastly, the liquor being poured off, wash the precipitated powder with boiling distilled water, and dry it.
Nota.	Note.
Magnesiæ Carbonas. Aqua destillata in quâ cocta fuerit, curcumæ colorem non mutat. Adjecto barii chlorido aut argenti nitrate, nihil demittit. Acido sulphurico diluto liquatur, ex 100 partibus 36·6 pondere amissis. Ubi effervescentia cessaverit, ex hoc liquore nihil demittitur per potassæ bicarbonatem.	Carbonate of Magnesia. Water in which it is boiled does not alter the colour of turmeric. Chloride of barium, or nitrate of silver, added to the water, does not precipitate anything. 100 parts dissolved in dilute sulphuric acid, lose 36·6 parts in weight. When the effervescence has ceased, bicarbonate of potassa does not precipitate anything from this solution.

Mr. Phillips illustrates this *Note* by the following *Remarks:*—"If the water in which it is boiled alter turmeric, excess of carbonate of soda has been used, and the carbonate of magnesia has not been sufficiently washed. If chloride of barium give a precipitate in the water, then either carbonate of soda, or sulphate of soda, or both, may be present from insufficient washing; and a precipitate yielded by nitrate of silver, insoluble in nitric acid, would indicate the presence of a chloride. The loss of 36·6 per cent. in weight by dissolving it in dilute sulphuric acid, is derived from expulsion of carbonic acid. Bicarbonate of potash does not precipitate magnesia from sulphuric acid; if, therefore, there be any precipitate on mixing them, it is derived from impurity."

According to Berzelius, the precipitate obtained by adding carbonate of soda to sulphate of magnesia, and thoroughly edulcorating and drying it at 212°, consists of—

Magnesia	41·60	to 43·2
Carbonic Acid	36·58	to 36·4
Water	21·82	to 20·4
	100·00	100·0

The *carbonate of magnesia*, therefore, or *Magnesia alba*, as it was formerly called, of the Pharmacopœia, is probably a compound of hydrate and carbonate of magnesia, in the proportion of 1 atom of quadrihydrate and 1 atom of carbonate. It differs considerably in texture and appearance, according to the methods adopted in precipitating and drying it, the principal object of the manufacturer being to procure it as smooth and free from grittiness or harshness as possible; it should also be colourless and tasteless.

Medical Uses of Magnesia and Carbonate of Magnesia. Pure magnesia is not calculated to fulfil any indications which may not be more conveniently attained by the use of the carbonate; it is, therefore, seldom prescribed except in those cases where it is presumed that the carbonic acid evolved from the carbonate by the action of the acids of the stomach might prove inconvenient. It may be given in doses of about ten, fifteen, or twenty grains, or, generally speaking, in a dose about one-third less than that of the carbonate.

Carbonate of magnesia, in doses of from one scruple to one drachm, has long been used as a neutraliser of acid in the stomach, and as operating gently upon the bowels; its activity as an aperient depends much upon the acid and other matters with which it meets in the *primæ viæ.* In the febrile affections which attend dentition, and in the aphthous fever of children, magnesia and saline remedies are employed to allay the symptoms. Small doses of carbonated magnesia are also effectual in some cutaneous eruptions; especially in the pimples about the chin, nose, and forehead, which are symptomatic of acidity in the stomach.

There is no application of magnesia more important than in cases of *uric*, or *red sand*, in which alkalies are generally used, but in which they frequently disagree or fail. It may here be administered in doses of twenty or thirty grains twice or three times a day, and except it has gone to a great height, or has continued so long as to become, as it were, habitual, it will usually check the increased secretion of uric acid; the red deposit in the urine becomes much diminished, or altogether disappears, and the irritation of the kidneys is proportionately relieved. It must not be forgotten, that in cases of *phosphoric*, or *white sand*, magnesia and other alkaline or antacid medicines are mischievous. Whenever magnesia is continuously administered, its tendency to lodge in the bowels must be prevented by the occasional use of aperients; for cases have occurred in which serious mischief has resulted from such accumulation.

Magnesia may be given in water, milk, or any aromatic water, or conjoined with bitters. The latter are proper in dyspeptic cases, and a little compound spirit of ammonia is frequently a useful adjunct.

℞ Magnes. Carbonatis, ʒss.
Infus. Gentianæ compos. ʒx.
Spirit. Ammoniæ compos. ʒss.
M. fiat haustus, ante prandium et vesperi sumendus.

In the above-named calculous affections, magnesia may be given in the vehicles just mentioned, or we may use its solution in carbonated water, which is manufactured by several soda-water makers, and sold under the name of *aërated magnesia water*, a pint of which, containing a drachm of magnesia, or more if required, may be taken daily.

Citrate of magnesia is not, as in the following extemporaneous prescription, a disagreeable aperient, especially when a little excess of lemon juice is used.

℞ Magnesiæ Carbonatis, ʒj.
Succi Limonum recentis, fʒiij.
Syrupi Tolutani,
Spiritûs Myristicæ, āā fʒj.
Aquæ destillatæ, fʒix.
Fiat haustus.

MAGNESIÆ SULPHAS. *Sulphate of Magnesia. Epsom Salt.* This salt is manufactured upon a large scale, and the sources from which it is obtained are either sea-water or magnesian limestone. The residue which remains after the separation of chloride of sodium from sea-water, is known under the name of *bittern;* it contains sulphate and chloride of magnesium; to this, sulphuric acid is added in sufficient quantity to decompose the latter, and the sulphate of magnesia is ultimately purified by repeated crystallisation. Magnesian limestone, which is a mixed carbonate of lime and magnesia, is also decomposed by sulphuric acid. Sulphate of lime and sulphate of magnesia are formed, and the latter salt is separated and purified by crystallisation. Sulphate of magnesia was formerly chiefly obtained from mineral or saline springs, and, among others, from those in the neighbourhood of Epsom. It is also produced abundantly in some alum works, but scarcely pays for its separation and purification.

The primary form of crystals of sulphate of magnesia is a right prism with a rhombic base. When exposed to dry air, the pure salt has a slight tendency to effloresce, but, under common circumstances, it is unalterable. At a red heat it loses the whole of its water of crystallisation, and if moistened in this dry state, it reabsorbs water with considerable elevation of temperature. It is soluble in about its own weight of water at 60°, and in three-fourths its weight of boiling-water. Its taste is saline and bitter. It consists of—

	Atoms.	Equivalents.	Per Cent.
Magnesia	1	20	16·3
Sulphuric Acid	1	40	32·5
Water	7	63	51·2
Crystallised Sulphate of Magnesia	1	123	100·0

Sulphate of magnesia should be colourless; it often contains a minute quantity of iron, which gives its solution a reddish tint on exposure to air, and which may be detected by the discoloration of tincture of galls. It is sometimes mixed with sulphate of soda, an adulteration most easily detected by the inferior weight of the precipitate obtained by adding carbonate of potassa, 100 grains of pure crystallised sulphate of magnesia furnishing a precipitate weighing, when dried at 212°, about 40 grains. If sulphate of magnesia contain common salt, or any other chloride, it is detected by pouring upon it a little sulphuric acid, which has no action on the pure salt, but evolves hydrochloric acid if any chloride be present. The following is the *Note* in the *Pharmacopœia* referring to this salt:—

MAGNESIÆ SULPHAS (*crystalli*). Facillimè in aquâ liquatur. Acido sulphurico huic liquori instillato, acidum hydrochloricum nullum emittit. Gr. 100 liquatis, et injectis in sodæ carbonatis liquorem ferventem, gr. 34 magnesiæ carbonatis exsiccatæ comparantur.	SULPHATE OF MAGNESIA (*crystals*). Very readily soluble in water. Sulphuric acid dropped into the solution does not expel any hydrochloric acid. 100 grains dissolved in water, and mixed with a boiling solution of carbonate of soda, yield 34 grains of dried carbonate of magnesia.

Medical Uses of Sulphate of Magnesia. This is one of the most useful and effective saline purges. In doses of from half an ounce to an ounce, it proves actively aperient, especially if taken in a sufficient quantity of liquid; in smaller doses, it may be conveniently given with tonics, to keep up a gentle action upon the bowels. It admits of mixture with magnesia or its carbonate; acids may also be given with it; indeed, one of the best vehicles for it is the compound infusion of roses. Infusion of cascarilla, and of gentian, with or without the addition of dilute sulphuric acid, may also be used; and these bitters cover, in a considerable degree, the more nauseous and unpleasant bitterness of the salt. Neither ammonia nor carbonate of ammonia precipitate magnesia from this salt under common circumstances; they may, therefore, be blended with it, especially where spasmodic pains and nausea follow its use.

If it be desired merely to evacuate the *primæ viæ* of their grosser contents, half an ounce of sulphate of magnesia, taken in half a pint of warm water, early in the morning, generally proves effectual. But where the bowels are loaded with viscid mucus, such a purgative, although operating freely, is far from cleansing them; in such cases, a preliminary dose of calomel and cathartic extract, or some purge of a more searching description, must be taken over-night, and the saline purge must be aided by others, as in the common *black dose:*—

℞ Magnesiæ Sulphatis, ℥ss.
Infusi Sennæ compos. f℥iss.
Tincturæ Sennæ,
Syrupi Zingiberis, āā f ʒj.
Spiritûs Ammoniæ compos. f ʒss.
Fiat haustus purgans.

It by no means follows that the bowels have been completely *emptied* or cleansed, because a dose of salts has performed its full duty; it may leave much offending matter behind, and symptoms may not subside, as far as they are connected with such a residuum. Thus it is, that the bowels are often drenched with mineral saline waters, which, though very active, are quite ineffectual in the relief of disorders that are soon cured by other purgatives.

Saline purgatives sometimes excite pain, and flatulency of the stomach and bowels, an effect generally remedied by combination with aromatics, spirituous stimulants, and ammonia.

It deserves notice, that small doses of sulphate of magnesia, especially when combined with bitters, are effectively aperient in some cases of habitual costiveness; it is generally necessary to precede its use in this way by a more active purgative, and then the following may be given daily, either at noon, or two hours before dinner:—

℞ Magnesiæ Sulphatis, ℥ss.
Infus. Rosæ compos.
Infus. Gentianæ compos. āā f℥vj.
Acid. Sulphurici diluti, ♏x.
Syrup. Zingiberis, f℥j.
M. fiat haustus.

MALVA. *Mallow. Malva sylvestris. Cl.* 16. *Ord.* 6. Monadelphia Polyandria. *Nat. Ord.* Malvaceæ.

The mallow is a mucilaginous herb, uselessly retained in the Materia Medica: when anything of this kind is required, the *Althea*, or Marshmallow, may be resorted to.

Decoctum Malvæ Compositum.	Compound Decoction of Mallow.
℞ Malvæ exsiccatæ, unciam,	Take of Mallow dried, an ounce,
Anthemidis exsiccatæ, unciam dimidiam,	Chamomile flowers dried, half an ounce,
Aquæ, octarium;	Water, a pint;
Coque per quartam horæ partem, et cola.	Boil for a quarter of an hour, and strain.

This decoction is sometimes used as a fomentation, and as a vehicle for the more active ingredients of clysters.

MANGANESII BINOXIDUM. *Binoxide of Manganese.*

Nota.	Note.
Manganesii Binoxydum, in acido hydrochlorico liquatur, chlorinium exhalans. Ex hoc liquore, quod dejicitur a potassa primùm albet, et citò fuscum fit; rarò autem accidit ut adjecto potassii ferrocyanido non viridescat. Ubi prius exsiccatum sit, et igne candente ustum, è partibus 100, pondere 12 amittit.	Binoxide of Manganese, dissolves in hydrochloric acid, evolving chlorine. What is thrown from this solution by potassa is at first white, and soon becomes brown: it rarely, however, happens that it is not rendered green by the addition of ferrocyanide of potassium. When first dried and then heated to whiteness, 100 parts lose 12.

Remarks by Mr. Phillips.—" If it dissolve in hydrochloric acid without effervescence or residue, and without giving a greenish or blue tint with ferrocyanide of potassium, it contains neither any carbonate, earthy matter, nor oxide of iron. The brown colour which the white precipitate soon assumes, is owing to the presence of oxygen. The loss of 12 *per cent.* is owing to the expulsion of oxygen, and red oxide of manganese is left."

The black or binoxide of manganese is found abundantly *native* in Devonshire, Somersetshire, and Aberdeenshire. It often has more or less of a gray metallic lustre, or it is of an earthy aspect and pulverulent; some of the varieties are crystallised, but it usually occurs in commerce in the form of a heavy black powder. Its principal consumption is in the production of chlorine, and it is often resorted to in the chemical laboratory as a source of oxygen, which it yields when heated to redness in an iron gas-bottle. For this purpose it should be previously dried, and care should be taken that it is not mixed with any carbonaceous matter. It consists of—

	Atoms.	Equivalents.	Per Cent.
Manganese	1	28	63·5
Oxygen	2	16	36·5
Binoxide of Manganese	1	44	100·0

MANNA. *Succus Concretus.* The concrete juice of the *Ornus Europœa.* *Cl.* 23. *Ord.* 2. Polygamia Diœcia. *Nat. Ord.* Oleaceæ.

This species of ash is a native of the South of Europe, especially of Calabria and Apulia. It is a small tree, twenty or thirty feet high, with a close round head. Leaves unequally pinnated, in three or four pairs; leaflets stalked, oblong, acute, serrated, very hairy at the base of the midrib on the under side. Panicles dense, terminal, nodding. Petals narrow, white, and drooping (*Lindley.*)

In dry and warm weather, manna exudes spontaneously from this tree, and concretes upon the bark; but the finest manna is procured by longitudinal incisions. Several varieties of this drug occur in commerce; the purest is called *flake manna;* the others are in smaller fragments, mixed with various impurities, and sometimes is said to be adulterated with sugar, honey, scammony, and other analogous articles. Fine flake manna, called also *Sicilian* or *Calabrian manna*, is in long pieces of a pale buff colour, moderately dry, friable, light, and bearing the impressions of the branches on which it had concreted; its texture generally appears granular, but it also presents fasciculi of acicular crystals: its odour is slightly disagreeable; its taste sweet and nauseous. It is perfectly soluble in water and in alcohol. When boiled in alcohol, the solution crystallises as it cools, depositing a peculiar modification of sugar which has been termed *mannite*, and which differs from common sugar in being unsusceptible of fermentation. Mannite constitutes about four-fifths of the best manna; the remainder is common sugar, and a peculiar yellowish extractive matter, in which the purgative quality resides.

According to Bucholz, 100 parts of flake manna contain—

Manna sugar (Mannite)	60·0
Uncrystallisable sugar and purgative principle	5·5
Gum	2·3
Viscid matter (gluten ?)	6·2
Water and loss	32·0

Manna is chiefly employed in doses of a drachm or two, as a mild aperient for children. In large doses it is apt to gripe and inflate, without purging, and scarcely proves active with adults in a quantity less than two ounces. The following aperient mixture, however, is a favourite with some practitioners:—

℞ Magnesiæ Sulphatis,
Mannæ, āā ℥j. solve, leni calore, in
Aquæ Menthæ Viridis, f℥vij. et adde
Tincturæ Sennæ, f℥j.
Fiat mistura laxans, cujus sit dosis cochlearia quatuor.

In some inflammatory diseases, especially those of the kidneys and bladder, where the bowels have been evacuated by a full dose of castor oil, the following is sometimes used to keep up a gentle aperient action:—

℞ Olei Amygdalæ,
Olei Ricini,
Mannæ optimæ, āā ʒj. tere simul, et adde gradatim
Aquæ Rosæ, fʒx.
M. fiat haustus, sextâ quâque horâ sumendus.

MARANTA. *Rhizomatis fæcula.* The starch of the *Maranta arundinacea.* *Cl.* 1. *Ord.* 1. Monandria Monogynia. *Nat. Ord.* Marantaceæ.

This plant is a native of the West Indies, South America, and the southern states of North America. The root is perennial, fibrous, producing numerous fusiform, fleshy, scaly, pendulous tubers from its crown. Stem two to three feet high, much branched, slender, finely hairy, tumid at the joints. Leaves alternate, with long, leafy, hairy sheaths, ovate, lanceolate, slightly hairy underneath, pale green on both sides. Panicles terminal, lax, spreading, with long linear sheathing bracts at the ramifications. Ovary hairy. Calyx green, smooth. Corolla white, small. Fruit nearly. globular, with three obsolete angles; the size of a small currant (*Lindley*).

The tubers yield the *Arrow-Root* of commerce, the uses of which have been adverted to under the article AMYLUM (page 61). The best arrow-root is perfectly white and inodorous, and in coarse powder or small lumps which easily crush when pressed. It sometimes acquires the odour of the boxes in which it is packed, but that goes off on exposure to air. The inferior arrow-root is mealy or pulverulent, not brittle, but soft, of a bad colour, and often musty. Its quality is best judged of by dissolving it in hot water, and examining the consistence and taste of the jelly when cold. In preparing it, the rhizomes or tubers are dug up when a year old, washed, pulped, and then agitated with water; the milky fluid so obtained is strained through coarse linen to separate the fibrous impurities, and then left at rest till the fæcula subsides; the supernatant fluid is then poured off, and the deposit well washed and dried in the sun. The import duty upon arrow-root from our own colonies is one shilling *per cwt.;* from foreign parts, two-pence *per lb.* In 1835, 987966 lbs. were imported, of which only 6267 were exported.

The *Maranta arundinacea* was formerly regarded as a powerful alexipharmic; its English name has been ascribed to its reputed property of counteracting the effects of poisoned arrows.

MARMOR. *Marble.* Indurated Carbonate of Lime (*see* page 133).

Marble, when bruised into small fragments, is a convenient source of carbonic acid gas, which is abundantly evolved during its solution in diluted hydrochloric acid. White or statuary marble should alone be used for this purpose; and it may be abundantly obtained in convenient fragments, from the statuaries.

Nota.	Note.
Marmor, album, acido hydrochlorico diluto cum effervescentiâ liquatur. Ex hoc liquore, Ammonia nihil demittit, vel adjectâ calcis sulphate in aquâ solutâ non permutatur.	Marble. White. Dissolves in hydrochloric acid, with effervescence. From the solution nothing is thrown down by ammonia, nor is it decomposed by the addition of a solution of sulphate of lime in water.

Perfectly pure ammonia produces no change in solution of chloride of calcium, so that if it occasion any precipitate, when applied as above directed, the marble contains some impurity. If solution of sulphate of lime give a precipitate, the presence of baryta or of strontia may be suspected; but trifling impurities are of no importance in reference to the purposes to which marble is applied in the pharmaceutical laboratory; and if it be white and granularly crystalline, and rapidly afford abundance of carbonic acid gas by the action of hydrochloric acid, no further tests need be resorted to.

MARRUBIUM. *White Horehound. Marrubium vulgare. Cl.* 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. Ord.* Labiatæ.

This indigenous perennial grows upon hedges and rubbish banks, and flowers in June; it has a fibrous root; the stalks are upright, strong, square, downy, and about eighteen inches high; the leaves are oblong, serrated, veined, wrinkled, hoary, and stand in pairs upon thick, broad, footstalks: the flowers are white, and produced in whorls at the footstalks of the leaves; the calyx is tubular, and divided at the mouth into ten narrow segments, hooked at the end; the corolla is monopetalous, gaping, compressed, consisting of a cylindrical tube, opening at the mouth into two lips; the upper lip is narrow and notched, the under lip is broader, reflected, and divided into three segments; the middle one is broad, and slightly scolloped at the end, the lateral ones are lanciform and short; the filaments are two long and two short, supplied with simple anthers, which are concealed in the tube; the germen is divided into four parts, from which issues a slender style, furnished with a cloven stigma; the seeds are four, of an oblong shape.

When recently dried, horehound has an aromatic odour, which it loses when kept: it has a bitter flavour. It was formerly regarded as a tonic, expectorant, and diuretic, and was used in asthma and coughs. In large doses it is slightly aperient. The expressed juice of the fresh plant is a favourite domestic remedy in some parts of the country: it is also used in the form of infusion, under the name of *horehound tea.* It is quite unimportant.

MASTICHE. *Resina.* The resin of the *Pistacia Lentiscus. Cl.* 22. *Ord.* 5. Diœcia Pentandria. *Nat. Ord.* Anacardiaceæ.

This evergreen bush is a native of the Levant. The leaves are equally pinnate. Leaflets eight to twelve, usually alternate, with the exception of the two upper, which are opposite, oval, lanceolate, obtuse, often mucronate, entire, and perfectly smooth. Flowers very small, in axillary panicles, similar to those of the other species. Fruit very small, pea-shaped, reddish when ripe (*Lindley*).

Mastic is chiefly exported from Chios, and its principal consumption is with varnish-makers; about three-fourths of it are soluble in alcohol, and have the properties of a brilliant, brittle, and colourless resin; a viscid and elastic matter remains, to which the toughness mastic assumes when chewed is owing, and which renders it useful for stopping hollow teeth. The medical virtues of mastic are insignificant: it has, however, been prescribed as a diuretic in some cases of gleet and gonorrhœa. It is occasionally a good adjunct to pills, enveloping their active matter, and thus rendering them less soluble in the stomach, and consequently more progressive in their operation. Upon this principle, it may be conjoined with rhubarb, aloes, and some other purgatives as in the following *Pilulæ ante Cibum*, or *Dinner Pills*, of the old *Paris Pharmacopœia.*

℞ Aloes, ʒvj.
Masticbes,
Rosarum rubrarum, āā ʒij.
Syrupi de Absynthio, q. s. ut fiat massa.

This mass is to be divided into pills of three grains each. "The operation of this pill," says Dr. Paris, "is to produce a copious and bulky evacuation, and in this respect experience has fully established its value. It is difficult to explain the *modus operandi* of the mastic, unless we suppose that it depends upon its dividing the particles of the aloes, and thereby modifying its solubility."

MEL. Honey. *Humor e floribus decerptus et ape mellificâ præparatus.* A juice collected from flowers, and prepared by the honey-bee.

NOTA.	NOTE.
MEL. Non nisi despumatum adhibendum est. In aquâ liquatum, potassii iodido et acido quovis simul adjectis, colorem cœruleum non exhibet.	HONEY. It is not to be used unless despumated. Dissolved in water, iodide of potassium and any acid being added, it does not become blue.

Starch or flour are said to be sometimes added, by way of adulteration, to honey, hence the application of the test of iodide of potassium and an acid, directed in the above *Note.*

No directions are given in the Pharmacopœia, as to the mode of despumating or clarifying honey: the process generally consists in keeping it for some time at a temperature of 212° in a water-bath; portions of wax and other impurities are thus partly deposited, and partly rise in the form of scum, and may be removed. The honey becomes transparent and less tenacious; it is directed to be used in this state, in the " Mellita," or Preparations of Honey, in the Pharmacopœia.

The general characters of honey are too well known to require enumeration: its flavour is much dependant upon the flowers from which it has been collected; it contains two distinct kinds of saccharine matter which may be separated by the action of strong alcohol; that which is dissolved is not crystallisable, and when obtained in a separate state, is in the form of a viscid syrup: the residue is granular, or imperfectly crystalline, and much resembles grape sugar.

As an article of the Materia Medica, honey is chiefly useful as a *vehicle*, and as a means of mixing some resinous and similar substances with water. With most persons it proves mildly laxative, and with some diuretic: it has occasionally been administered in nephritic complaints. " In some parts of Asia and America a poisonous honey is met with, which probably owes its deleterious properties to the flowers on which the bees feed. It is supposed that the honey extracted from the *Azalea Pontica*, and from species of the genera *Kalmia*, *Andromeda*, and *Rhododendron*, are poisonous; and that the honey carried from the *Azalea Pontica* was that which poisoned the Greek soldiers in the celebrated Retreat of the Ten Thousand through Pontus. In the Island of Bourbon honey of a green colour, and very fragrant, is prepared, and bears a high price in India, to which it is chiefly exported. But bees do not sip the honey secreted in all flowers; thus they refuse the *Fritillaria imperialis*, and *Nerium Oleander*, which kills thousands of flies." (*Lond. Disp.*)

When honey dissolved in water is fermented by the addition of yeast, it produces that modification of wine called *mead.*

MELALEUCA MINOR, *see* CAJUPUTI OLEUM.

MENTHA PIPERITA. *Peppermint.* *Cl.* 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. Ord.* Labiatæ or Lamiaceæ.

This is an indigenous perennial plant growing in moist places: it is found over the whole of Europe, in Egypt, central Asia, India, and North and South America. In this country it is cultivated for medical use, especially at Mitcham, in Surrey, whence the London market is chiefly supplied. Its root is creeping and fibrous; the stems are erect, square, jointed, striated, branched at top, and about two feet high; the leaves are ovate, serrated, pointed, nerved, dark-green, and stand in pairs upon footstalks; the flowers are small, purple, and produced in terminal spikes, separated into clusters: the calyx is tubular, persistent, reddish, striated, hairy, and divided at the brim into five small pointed segments: the tubular corolla is divided at the limb into four segments, of which the uppermost is the broadest, and notched at the apex: the filaments are tapering, and furnished with roundish anthers; the germen is divided into four parts, supporting a slender, erect style, which is longer than the corolla, and terminated by a cloven stigma: the seeds are four, small, and lodged in the calyx.

The odour of peppermint is strong and peculiar; its taste pungent, leaving a peculiar impression of coldness upon the tongue. When either the dry or fresh herb is distilled with water, a highly odorous and pungent oil is obtained, the relative proportion of which varies exceedingly; in a warm, dry, and favourable season, the produce of oil from a given quantity of the fresh herb is double that which it yields in a wet and cold season. The largest produce is three drachms and a half of oil from two pounds of fresh peppermint, and the smallest, about a drachm and a half from the same quantity. The quality of this oil is also variable as to taste and odour. There is a variety of peppermint, the foliage of which has a darker hue than the *green* herb commonly cultivated, and its essential oil always partakes of the flavour of pennyroyal, often to such an extent as leads to a suspicion of mixture or adulteration.

Oil of peppermint is a useful stimulant and cordial. In spasm and flatulence of the stomach and bowels, in cramp, faintness, and nausea, it is a favourite remedy, a drop or two being taken upon a piece of sugar, or triturated with powdered sugar, so as to form an *Elæosaccharum*. It is also occasionally added to purging pills and other remedies, to prevent griping. It has been recommended as a stimulant in cases of Asiatic cholera.

Peppermint drops are a common and convenient form of oil of peppermint; they are made as follows:—four ounces of white sugar in fine powder are put into a bright copper ladle, made shallow, and with a lip to it, and constantly stirred over a clear charcoal fire, till so hot as not to be borne by the hand. Twenty-four minims of oil of peppermint and half a fluid ounce of peppermint water are then added, and the whole rapidly stirred together, till of such consistency as barely to admit of being dropped out by the assistance of the spatula, upon a piece of polished marble, where the drops speedily harden, and are afterwards to be dried in a very gentle heat. *Peppermint lozenges* are a mixture of starch, sugar, and mucilage of tragacanth, flavoured with oil of peppermint.

AQUA MENTHÆ PIPERITÆ.	PEPPERMINT WATER.
℞ Menthæ piperitæ exsiccatæ, libras duas, *vel*	Take of dried Peppermint, two pounds, *or*
Olei Menthæ piperitæ, drachmas duas,	Oil of Peppermint, two drachms,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos;	Water, two gallons;
Destillet congius.	Let a gallon distil.
Ubi herba recens adhibetur pondere duplo utendum est.	When the fresh herb is employed, double the above weight of it is to be used.

Peppermint water, when well prepared and sufficiently strong, is an excellent cordial in common cases of flatulency and spasmodic pains of the stomach and bowels: it is one of the best vehicles for saline and several other purgatives, not only preventing or diminishing their griping tendency, but covering their nauseousness and rendering them altogether more agreeable to the stomach as well as the palate. Violent cramps of the stomach may sometimes be relieved by a wine-glassful of hot peppermint water.

Spiritus Menthæ Piperitæ.	Spirit of Peppermint.
℞ Menthæ Piperitæ Olei, drachmas tres,	Take of Oil of Peppermint, three drachms,
Spiritûs tenuioris, congium,	Proof Spirit, a gallon,
Aquæ, octarium;	Water, a pint;
Misce; tum lento igne destillet congius.	Mix; then, with a gentle fire, let a gallon distil.

This is an adjunct useful in the same cases as peppermint water, or forming, when diluted, an extemporaneous substitute for it. A more useful, though analogous preparation is the *Essence of Peppermint*, which is a mixture of one part of oil of peppermint with three of rectified spirit, or alcohol: it is often coloured green by a little spinach juice, or by the green leaves of peppermint: it may be taken upon a lump of sugar, to the extent of eight or ten drops.

MENTHA PULEGIUM. *Pennyroyal.*

This plant, like the former, is found in wet ditches, and similar places, over the greater part of Europe. Its stem is procumbent or prostrate, very much branched, more or less hairy, rooting. Leaves scarcely half an inch long, often much less, stalked, ovate, obtuse, with a few shallow unequal serratures, full of pellucid dots, and a little hairy, chiefly underneath. Whorls sessile, numerous, many-flowered, globose, distant, large in proportion to the foliage. Flowers light purple, or nearly white. Calyx hispid, two-lipped, villous in the inside of the throat.

The *Distilled Water* and the *Spirit of Pennyroyal* are directed to be prepared in the same way as the corresponding preparations of peppermint; and the *Oil of Pennyroyal* has a place among the "Olea Destillata" of the Pharmacopœia. Of this oil, the fresh herb yields from $\frac{1}{120}$th to $\frac{1}{100}$th of its weight.

The old physicians had a high opinion of the virtues of pennyroyal in hysteria and uterine obstructions, and accordingly, pennyroyal tea, and pennyroyal water, were resorted to in various nervous affections, and as emmenagogues. The water is not an improper adjunct in such cases, to chalybeates, valerian, and similar remedies, and may be substituted for the rose-water in the *Mistura Ferri composita.* Pennyroyal water was also regarded as antispasmodic and expectorant, and therefore used in whooping-cough and asthma; it is now, however, rarely prescribed.

MENTHA VIRIDIS. *Green or Spear-mint.*

This species of mint is found in marshy places in the milder parts of Europe, the Canaries, the Cape of Good Hope, and North and South America. It is a creeping-rooted, herbaceous plant, with an erect smooth stem. Leaves subsessile, ovate, lanceolate; unequally serrated, smooth; those under the flowers all bract-like, rather longer that the whorls; these last, and the calyxes, hairy or smooth. Spikes cylindrical, loose. Whorls approximated, or the lowest, or all of them distant.

This species of mint is selected for medical use just when the flowers appear. Its peculiar aromatic flavour is well known. It is useful in the same cases as peppermint; its officinal preparations are a distilled water, spirit, and essential oil: the average produce of the latter is not more than about $\frac{1}{500}$th of the weight of the fresh herb, so that it generally bears a much higher price than the distilled oil of peppermint, and is neither more agreeable nor efficacious.

MENYANTHES. Buckbean. Water Trefoil. *Menyanthes trifoliata.* *Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Gentianaceæ.

The buckbean is common in boggy and marshy soils in Europe and North America. Rhizoma penetrating horizontally in the bog-earth to a great distance, regularly intersected with joints at the distance of about half an inch from each other; these joints are formed by the breaking off of the old petioles and their sheaths. The leaves proceed from the end of the rhizoma on long stalks furnished with broad sheathing stipules at base; they are trifoliate, nearly oval, glabrous, somewhat fleshy, and slightly repand, or furnished with many irregularities at the edge, which hardly prevent them from being entire. Scape round, ascending, smooth, bearing a conical raceme of flowers. Peduncles straight, supported by ovate, concave bractes. Calyx erect, somewhat campanulate, five-parted, persistent. Corolla white, its tube short, border five-cleft, spreading, and at length revolute, clothed on the upper part with a coating of dense, fleshy, obtuse hairs. Stamens five, shorter than the corolla, and alternate with its segments; anthers oblong-arrow-shaped. Ovary ovate; stigma bifid, compressed. Capsule ovate, two-valved, one-celled. Seeds numerous, minute (*Lindley*).

The whole of this plant is bitter, and, in sufficient doses, nauseant and purgative; it is also placed by some writers amongst diuretic and diaphoretic remedies. It is occasionally prescribed in intermittents, as a tonic; and in chronic rheumatism, and some cutaneous affections, as a diaphoretic alterative. It is, however, rarely used, and there are no officinal formulæ of it in the Pharmacopœia. It is best administered in infusion as follows:—

℞ Folior. Menyanthes sicc. ℥ss.
Aquæ ferventis, octarium;
Macera per horas quatuor, et cola.

℞ Colaturæ, f℥x.
Tinct. Cardam. compos. f℥j.
Misce.

To this ten grains of the powdered leaves may be occasionally added.

Menyanthes is said to have been used as a substitute for hops; and, according to Paris, when given in the dose of one drachm of the powdered leaves, it is a cure for the rot in sheep.

MEZEREUM. *Radicis Cortex.* The bark of the root of the *Daphne Mezereum. Cl.* 8. *Ord.* 1. Octandria Monogynia. *Nat. Ord.* Thymelaceæ.

The mezereum is a shrub four or five feet high, a native of the woods of Europe, especially in the central countries, and commonly cultivated in our gardens. Its stem is bushy and branched; the bark is smooth and gray; the root fibrous, and covered with smooth, olive-coloured bark; the leaves are few, tender, lance-shaped, sessile, deciduous, and appear after the flowers are expanded, at the end of the branches. The flowers surround the branches in clusters; they are sessile, monopetalous, tubular, and the limb is divided into four oval, spreading segments of a pink or purple colour; the stamina are eight, alternately shorter, and concealed within the tube of the corolla; the style is short, the stigma flat, and the germen, which is oval, becomes a red berry, containing a round seed.

The bark of mezereon, and especially of the root, contains an acrid sap, which irritates and produces a serous discharge when applied to the skin. The fruit is also acrid and poisonous, and its tempting appearance such, as sometimes to induce children to swallow it; in such cases, an emetic should be given as soon as possible, followed by demulcent drinks. Linnæus says that he once saw a girl die of excessive vomiting and hæmoptysis, from having taken twelve of the berries to cure an ague; he also states that six of the berries will kill a wolf.

Infusions and decoctions of mezereon have been recommended in chronic rheumatism, in some cutaneous disorders, and in certain venereal affections; but it is a remedy too uncertain to merit the eulogies that have been bestowed upon it, and is very rarely employed even as a local stimulant. It enters into the composition of the compound decoction of sarsaparilla.

A crystallisable principle, termed *daphnin*, was obtained from this plant by Vauquelin, and has been subsequently examined by Gmelin and Bär; they obtained it by precipitating a decoction of mezereon bark by subacetate of lead, washing the precipitate, and decomposing it, diffused through water, by sulphuretted hydrogen; the solution was then filtered, evaporated, and the residue digested in cold anhydrous alcohol, from which the daphnin crystallises, leaving malic acid and colouring matter. Daphnin, when purified, forms bitter colourless crystals, neither acid nor alkaline; its medical and toxicological properties have not been ascertained.

The root and bark of the *Daphne Gnidium*, a small bush found upon the hills and plains of the southern parts of Europe, are used in France, under the name of *garou*; the *Daphne Laureola*, or common *spurge laurel*, is frequently, and, indeed, generally, substituted for mezereum; it is found in the woods over the whole of Europe, as far south as Sicily.

MOMORDICA ELATERIUM, *see* ELATERIUM.

MORUS. Mulberries. The fruit of the *Morus nigra*. *Cl.* 21. *Ord.* 4. Monœcia Tetrandria. *Nat. Ord.* Urticaceæ.

The mulberry tree is a native of Persia: it is cultivated over the greater part of Europe, flowering in June, and ripening its fruit in September. Its leaves are numerous, on short footstalks, and about three inches in length and breadth, cordated, serrated, and veined, rough, and deep green on the upper surface, and paler beneath. The male flowers are on the same tree as the female; they are in close roundish catkins, composed of caducous florets, which consist of four concave, oval, erect, calycinal leaves, inclosing four filaments, bearing simple anthers. The female flowers contain a roundish germen, crowned with two styles, and simple stigmas, inclosed in a calyx of four ovate, concave, erect leaves, which, after flowering, enlarge, and become juiced and red, investing the seed. Many of these congregated on one peduncle form the compound berry.

The fruit of the mulberry owes its acidity to tartaric acid: it is very grateful, and forms the basis of an elegant syrup, but very liable to ferment. The bark is said to be a purgative vermifuge. The root of the *Morus alba* is also used for the same purpose.

Syrupus Mori.	Syrup of Mulberry.
℞ Mororum Succi colati, octarium, Sacchari, libras duas cum semisse;	Take of Mulberry Juice, strained, a pint, Sugar, two pounds and a-half;
Liqua saccharum in succo mororum, leni calore, tum sepone per horas viginti quatuor, dein spumam aufer, et a fæcibus, siquæ sint, liquorem purum effunde.	Dissolve the sugar in the juice of the mulberries, by a gentle heat; then set aside twenty-four hours, afterwards remove the scum, and pour off the clear liquor from the sediment, if there be any.

MORPHIA, *see* Opium.

MOSCHUS. Musk. This substance is defined in the Pharmacopœia as "*Humor in folliculo præputii secretus*—a juice secreted in the follicle of the prepuce" of the musk deer. (*Moschus Moschiferus*, Linn.)

This animal inhabits the mountains of Eastern Asia, especially the Himalayan Chain; it is also found in China, in Cochin China, Tartary, and Siberia. It is extremely shy and solitary; its length rarely exceeds three feet; it has no horns, but in other respects somewhat resembles a deer. Different methods are resorted to for taking it; sometimes it is caught in snares, or pitfalls, or shot by the bow and arrow. The musk-bag is placed in front of the prepuce of the male. It has two apertures; the one external, and opening by a small orifice about half an inch from the umbilicus, and about a line and a half from the prepuce; the other opening into the prepuce, and having a number of hairs projecting from it. The former orifice admits of the occasional evacuation of portions of the musk. Wood-cuts of these different parts, and of the skeleton of the animal, are given by Mr. Pereira, in illustration of his lectures on the Materia Medica, published in the *Medical Gazette* (xvii., 369). The musk sac is oval, flat and smooth above, and convex below; its breadth from an inch and a quarter to an inch and three quarters; its length from two inches to two inches and a-half. It has an outer hairy coat or skin; a fibrous or muscular coat, and an inner smooth membrane; the musk is secreted by appropriate glands. In the young animal the bag is empty, but in the adult, it contains two or three drachms of musk, which, in the fresh state, has the consistence of an electuary, and a reddish-brown colour.

Musk is chiefly imported into this country from China and Russia. Chinese, Thibet, or Tonquin musk, comes into the market in small boxes holding about twenty-five pods each, and lined internally with sheet-lead and paper, and externally with silk; the pods are generally flattened spheres, or somewhat oval; they are covered by short yellowish hair, arranged concentrically round the orifice of the sac. Mr. Pereira gives the following average of the weights of six pods:—

	Drachms.	Grains.
1	5	30
2	4	30
3	8	37½
4	9	47½
5	5	20
6	3	30
Total	37	15
Average	6	12½

The relative proportion of the musk to the containing pods in these was as follows:—

	Drachms.	Grains.
Musk	16	15
Coats of the sacs	21	0
Total	37	15
Average quantity of musk in each sac	2	42½

Good musk is somewhat unctuous to the touch, of a rich dark-brown colour, a bitterish aromatic taste, and of an intense and peculiar odour.

According to Geiger and Reimann, the following substances are found in the finest China musk:—

Fatty matter	1·1
Cholesterine	4·1
Bitter resin	5·0
Osmazome, with hydrochlorate of ammonia, chlorides of sodium and calcium, and a peculiar acid	7·5
Peaty substance, combined with ammonia, and small quantities of phosphate of lime, magnesia, sulphate of potass, chlorides of potassium, carbonate of soda, and traces of iron	36·5
Water, peculiar volatile matter, an acid, and ammonia	45·8
	100

According to Geiger and Reimann, the odorous principle of musk requires the presence of the vapour of water for its development; it becomes inodorous when dried in vacuo over sulphuric acid, and regains its odour when moisture is present.

The adulterations of musk are not easily detected, and among them the admixture of dried blood, which is said to be most frequent, is that which is most difficultly recognised. If, when burnt, it exhale a strong smell of burnt horn, we may suspect that blood has been added; for the odour thus exhaled by genuine musk, differs from that of burnt blood. If it fuse when heated, some bituminous or resinous substance has probably been mixed with it. Earthy matter, shot, and clippings of lead, are sometimes found in it. Sometimes the sacs themselves are said to be imitated by the skins of animals, or the scrotum of a goat. Careful comparison with genuine musk best enables us to judge of these and other sophistications. An infusion of genuine musk gives no precipitate when added to a solution of corrosive sublimate. Nitric acid, acetate of lead, and infusion of galls, occasion precipitates in the infusion of genuine musk; when burned, it leaves a gray residue, whereas that of burned blood is reddish. The circumstance of the pods being sewn up, is sometimes regarded as indicating adulteration, but this is probably done to prevent the escape of the musk rather than for the purpose of introducing foreign matters.

Musk is placed among the stimulant antispasmodics of the Materia Medica; but much difference of opinion exists as to its efficacy; and its high price and liability to adulteration are against its employment. It has been recommended in many spasmodic diseases, but seldom had recourse to except in obstinate and peculiar cases. Dr. A. T. Thomson speaks highly of a combination of musk and calomel in epilepsy, and attributes the disappointment which has generally attended its use to the remedy having been adulterated, or the smallness of the dose. He gave half a drachm four times daily. It is best given in pills, or electuary, or in a very small quantity of liquid, united with other antispasmodics or stimulants.

℞ Moschi, ℈j.
Camphoræ (ope Spt. Vin. pulverisat.) gr. v.
Confect. Rosæ Gall. q. s. ut fiat bolus.

℞ Moschi, ℈j. ad ʒss.
Mucil. Arabic. ʒj. tere simul, et adde
Mistur. Camphor. f℥j.
Spirit. Ammon. compos. fʒj.
M. fiat haustus pro re nata sumendus.

The *musk mixture* of the Pharmacopœia is another somewhat more diluted form of musk; from one to two ounces has been given every three or four hours in the delirious and sinking stage of typhus fevers. It has been recommended by Dr. White, in combination with ammonia, to check the progress of gangrene, and in ill-conditioned phagædenic ulcers. Great expectations were at one time entertained regarding the use of musk in hydrophobia, but, like all other remedies, it has there unfortunately proved ineffective. In violent cases of common cholera, it has been resorted to, to allay the pain, spasm, and vomiting. In Asiatic cholera it has been tried as a stimulant without success. On the whole, the evidence which has been adduced appears favourable to the antispasmodic and cordial powers of this article of the Materia Medica, but its scarcity must always stand in the way of its general employment. Whether the blood and the secretions of persons taking musk, do or do not become inpregnated with its odour, is a question hitherto not satisfactorily determined. According to Tiedemann and Gmelin its odour is perceptible in the blood, but not in the contents of the lacteals.

Some persons, from idiosyncracy, cannot endure even the remote odour of musk; it produces headache, giddiness, nausea, and fainting; drowsiness and stupor have occasionally been induced by it when given in small medicinal doses.

Mistura Moschi.	Mixture of Musk.
℞ Moschi,	Take of Musk,
Acaciæ contritæ,	Gum Acacia, powdered,
Sacchari, singulorum drachmas tres,	Sugar, of each, three drachms,
Aquæ Rosæ, octarium;	Rose Water, a pint;
Tere moschum cum saccharo, deinde cum acaciâ, instillatâ paulatim aquâ rosæ.	Rub the musk with the sugar, then with the gum, gradually adding the rose water.

MUCUNA. *Leguminum pubes.* The bristles of the pods of the *Mucuna pruriens.* *Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Leguminosæ.

This plant, the *Dolichos pruriens* of former Pharmacopœiæ, is common in the West Indies and in woods, along river-courses, and in waste and neglected places. Leaflets entire, ovate, acute, smooth above, hairy beneath; the lateral ones oblique at the base, the middle one slightly rhomboidal; racemes lax, many-flowered, interrupted, one to one and a-half foot long; calyx hairy, pink, with narrow, lanceolate segments. Flowers with a disagreeable alliaceous smell. Vexillum flesh-coloured; wings purple or violet; keel greenish white; legume about three inches long, the thickness of the finger, closely covered with strong, brown, stinging hairs. Seeds oblong, variegated, with white hilum.

Under the name of *Cowitch*, the spiculæ, or hairs of the pods, have long been used as anthelmintics, especially in cases of *lumbricus teres;* it acts as a mechanical irritant, and is best administered in syrup or despumated honey, into which the pods may be first dipped and then scraped, so as to form an electuary; it requires to be followed by a brisk purge. Much irritation about the anus is apt to follow the use of this very inconvenient vermifuge.

MURIATIC ACID, *see* Hydrochloric Acid.

MYRISTICA. Nutmeg. *Nuclei.* The *nuts* of the *Myristica moschata.* *Cl.* 22. *Ord.* 13. Diœcia Monadelphia. *Nat. Ord.* Myristicaceæ.

"The nutmeg tree is a native of the Moluccas, especially of the island of Banda. Trunk twenty to twenty-five feet high; bark grayish-brown, tolerably smooth, abounding in a yellow juice. Leaves aromatic, from three to six inches long, subbifarious, oblong, approaching to elliptical, glabrous, rather obtuse at the base, acuminate, quite entire, above dark-green and somewhat glossy, beneath much paler, but neither pulverulent nor downy. Petioles from one-half to three-fourths of an inch long, plain above; racemes axillary, subumbellate, sometimes forked or compound; peduncles and pedicels glabrous, the latter having a quickly deciduous ovate bract at its summit, often pressed close to the flower. Male flowers three to five or more on a peduncle. Calyx urceolate, thick and fleshy, and clothed with an indistinct reddish pubescence, dingy pale yellow, cut into three erect or erecto-patent teeth. Filaments incorporated into a thickened whitish cylinder, about as long as the calyx, the upper half covered by about ten linear-oblong two-celled anthers, free at their base, opening longitudinally. Female flowers scarcely different from the male, except that the pedicel is very frequently solitary. Pistil solitary, shorter than the calyx, broadly ovate, a little tapering upwards into a short style, and bearing a two-lobed persistent stigma. Fruit fleshy, nearly spherical, of the size and somewhat of the shape of a small pear; flesh astringent, yellowish, almost white within, four or five lines thick, opening into two nearly equal longitudinal valves. Arillus thick, between horny and fleshy, much lacerated, folding and anastomosing towards the extremity, enveloping the nut almost entirely, and so tightly as to form inequalities on its surface; when fresh, brilliant scarlet; when dry, much more horny, of a yellow brown colour, and brittle. Nut, broadly ovate, or oval; the shell very hard, rugged, dark-brown, glossy, about half a line thick, pale, and smooth within; seed, or nutmeg, oval, pale-brown, quite smooth when first deprived of its shell, but soon becoming shrivelled, so as to have furrows upon its surface. Albumen firm, but fleshy, whitish, but so traversed with red-brown veins, which abound in oil, as to appear marbled. Near the base of the albumen, and imbedded in a cavity in its substance, is the embryo, which is small, fleshy, yellowish-white, rounded below, where is the radicle; its cotyledons of two large, somewhat foliaceous, plicate lobes, in the centre of which is seen the plumule. The seed is the nutmeg of the shops. The aril is the mace." (*Lindley.*)

When the fruit is gathered, the mace is separated and dried in the sun; the nutmegs are then gently baked, taken out of their shells, and washed in lime-water.

Nutmegs should be dense, mottled, and greasy in the interior: those which are light, brittle, or pulverulent, are to be rejected. Mace should be bright brown, or nearly orange-coloured, aromatic, and high flavoured.

Mace and nutmegs afford an essential and an expressed oil. According to Spielman, nutmegs yield one-sixteenth their weight of essential oil, and about one-third of their weight of expressed oil. According to Bonastre, nutmegs contain—

Volatile oil	6·0
Fixed oil	7·6
Concrete oil	24·0
Starch and gum	3·4
Woody fibre	54·0
Acid?	0·8
Loss	4·2
	100

The expressed oil, generally called *oil of mace*, is usually imported wrapped in flag leaves, of the consistence of marrow, an orange colour, and fragrant. The only use made of it is in the *Emplastrum Picis compositum*, where it might be omitted. It is probably generally adulterated, and it is said to be commonly composed of suet, palm oil, and a little of the genuine oil to give it odour.

The volatile, or distilled oil, has the odour and flavour of the nutmeg in a high degree; it is very pale yellow, limpid, and lighter than water; it gives flavour to the following, which is the only officinal preparation of the nutmeg:—

Spiritus Myristicæ.	Spirit of Nutmeg.
℞ Myristicæ contusæ, uncias duas cum semisse,	Take of Nutmegs, bruised, two ounces,
Spiritûs tenuioris, congium,	Proof Spirit, a gallon and a-half,
Aquæ, octarium;	Water, a pint;
Misce; tum lento igne destillet congius.	Mix; then, by a slow fire, let a gallon distil.

Half a drachm or a drachm of this spirit is an agreeable addition to the common saline draughts; otherwise it is not much used.

The general qualities of the nutmeg are well known; in large doses it is said to be somewhat narcotic. With other spices, it forms a principal ingredient in the following "aromatic confection" of the Pharmacopœia, which is an elegant and useful stimulant and cordial, and an excellent adjunct to a variety of other remedies:—

Confectio Aromatica.	Aromatic Confection.
℞ Cinnamomi,	Take of Cinnamon,
Myristicæ, singulorum, uncias duas,	Nutmeg, of each, two ounces,
Caryophilli, unciam,	Cloves, an ounce,
Cardamomi, unciam dimidiam,	Cardamoms, half an ounce,
Croci, uncias duas,	Saffron, two ounces,
Cretæ preparatæ, uncias sedecim,	Prepared Chalk, sixteen ounces,
Sacchari, libras duas;	Sugar, two pounds;
Arida simul in pulverem subtilissimum contere et vase obturato serva. Quotiès autem confectione utendum est, aquam paulatim adjice, et misce, donec corpus unum sit.	Rub the dry ingredients together into a very fine powder, and keep them in a stopped vessel. But as often as the confection is to be used, gradually add water, and mix till incorporated.

MYRRHA. Myrrh. *Gummi-Resina.* The *gum-resin* of the *Balsamodendron Myrrha.* (*Protium Kataf*, Lindley). *Cl.* 8. *Ord.* 1. Octandria Monogynia. *Nat. Ord.* Burseraceæ.

According to Ehrenberg, this celebrated gum-resin is the produce of the above tree; it grows on the borders of Arabia Felix, in the province of Gison; it has whitish-gray bark, and white wood, leaflets ternate, blunt, or acute, serrated at the end. Peduncles corymbose at the ends of the branches, filiform for the space of an inch, simple, afterwards dichotomously branched; teeth of calyx lanceolate, the length of the tube; fruit globose, with a depressed umbilicus at the point, short stalked, smooth, brown, ovate, rather larger than a pea. Myrrh exudes from and concretes upon the bark.

Myrrh is chiefly imported from Turkey, in the form of irregular tears and their fragments, of a reddish-brown colour, more or less translucent, a fragrant aromatic odour, and a warm pungent taste. It crumbles between the teeth, and should not be sticky or insipid. It does not readily fuse, nor is it very inflammable. Its specific gravity is about 1·36.

The Abyssinian myrrh, which comes to us through the East Indies, is sometimes largely mixed with other gummy resinous substances; with bdellium, which is dark-coloured, opaque, and nauseously bitter; and with a pale and nearly transparent gum, which has not the characters of myrrh.

The following is Brandes' analysis of select myrrh:—

Volatile oil	2·60
Bitter resin	22·24
Tasteless resin, insoluble in ether	5·56
Gum	54·38
Bassorin	9·30
Malic, acetic, and benzoic acid, partly combined with potassa and lime	1·36
Impurities and loss	4·55
	100

Myrrh is a valuable stimulating tonic. It may be given in doses of from five to twenty grains, either in pills, or triturated with any aromatic water, in the form of a draught: it is an excellent adjunct to carbonate of iron, as in the *Mistura Ferri composita* (page 243); it may be united with aloes and chalybeates as an emmenagogue; and with cinchona and other bitters as a general tonic. Such combinations are well adapted to leucophlegmatic and torpid habits; it improves the appetite, and generally agrees well with the stomachs of delicate persons, especially where the bowels have a relaxed tendency. Combined with expectorants, it is used in asthmatic affections, and in phthisis pulmonalis, when the debility from expectoration is considerable, and where it is not otherwise contra-indicated. The following are good expectorant formulæ, applicable in cases of chronic catarrh; they are taken from Dr. Paris's *Pharmacologia:*

℞ Myrrhæ Gum. Resin. ʒiss.
Scillæ exsiccatæ, ʒss.
Extract. Hyoscyam. ℈ij.
Aquæ q. s. ut fiant pilul. xxx., è quibus sumantur binæ nocte maneque.

℞ Pulver. Myrrhæ. gran. xij.
Pulver. Ipecacuanhæ, gran. vj.
Potassæ Nitratis, ʒss.
Misce, et divide in doses æquales quatuor, quarum sumat unam quartis horis.

Where a combination of tonics and aloetics is required, the following pills may be used:—

℞ Pilul. Aloes cum Myrrhâ, ʒj.
Ferri Sulphatis,
Potassæ Carbonatis, āā ℈j.;
Misce et divide in pilulas xxiv. sumantur duæ omni nocte.

The *Pilulæ Ferri compositæ* (page 244), are a similar combination.—When prescribed in the liquid form, a small lump of select myrrh rubbed up with the gradual addition of water, forms a more uniform milky mixture than when the myrrh is previously powdered; as in the following formula:—

℞ Myrrhæ, ʒij. tere et solve in
Misturæ Camphoræ, f℥vij. et adde
Syrupi Croci, f℥ss.
Tincturæ Myrrhæ,
Spirit. Ammon. compos. āā fʒij;
Misce fiat mistura. Cochlearia iij. pro dosi.

The *Tincture of Myrrh* of the Pharmacopœia is an alcoholic solution of the resin of myrrh; it is useful when diluted with water, as a mouth-wash, and as an ingredient in stimulant gargles, and is sometimes applied to foul ulcers. In the dose of half a drachm or a drachm it is occasionally added to draughts and mixtures.

TINCTURA MYRRHÆ.	TINCTURE OF MYRRH.
℞ Myrrhæ contritæ, uncias tres,	Take of Myrrh, in powder, three ounces;
Spiritûs rectificati, octarios duos;	Rectified Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

MYRTUS PIMENTA, *see* PIMENTA.

NARCOTICS (*νάρκη*, *stupor*). Medicines which induce sleep, or, in larger doses, stupor. *Hypnotics*, *anodynes*, and *sedatives*, are other terms applicable to the same class of remedies.

NARCOTINE, *see* OPIUM.

NICOTINA, *see* TABACUM.

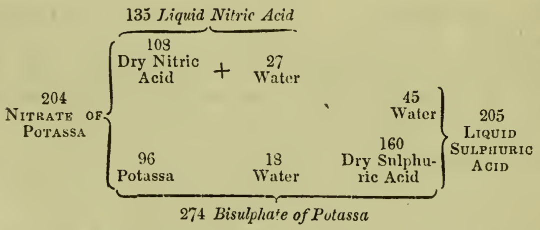
NICOTIANA TABACUM, *see* TABACUM.

NITRIC ACID. This important acid is generally obtained by the distillation of nitrate of potassa (*see* POTASSÆ NITRAS) with sulphuric acid, according to the following formula of the Pharmacopœia, which, with some modifications as to proportions and apparatus, is the process generally adopted by the wholesale manufacturer, from whom the acid is usually procured for pharmaceutical and medical use.

ACIDUM NITRICUM.	NITRIC ACID.
R Potassæ Nitratis exsiccatæ,	Take of Nitrate of Potassa, dried,
Acidi Sulphurici, singulorum, libras duas;	Sulphuric Acid, of each, two pounds;
Misce in retortâ vitreâ, tum balneo arenæ destillet acidum.	Mix in a glass retort, then let the acid distil in a sand-bath.

NOTA.	NOTE.
ACIDUM NITRICUM. Calore in vapores totum abit. Idem aquâ destillatâ mixtum nihil, ab argenti nitrate, vel a barii chlorido, demittit. Pondus specificum est 1·50. Sodæ carbonatis crystallorum circitèr gr. 217 ab hujus acidi gr. 100 saturantur.	NITRIC ACID. By heat it wholly passes off in vapour. Mixed with distilled water, nothing is thrown down from it by nitrate of silver, or chloride of barium. Its specific gravity is 1·50. About 217 grains of crystals of carbonate of soda are saturated by 100 grains of this acid.

In the above process the (anhydrous) nitric acid of the salt combines with the water of the sulphuric acid to form the liquid or hydrated nitric acid, while the anhydrous sulphuric acid unites to the potassa to form sulphate of potassa. According to Mr. Phillips (*Trans. Lond. Pharm.*), when 2 equivalents of nitre and 4 equivalents of sulphuric acid (sp. gr. 1·84) are distilled, 2 equivalents of liquid nitric acid, and 2 of crystallised bisulphate of potassa, are the results, as shown in the following diagram:—



This, therefore, represents the concentrated liquid nitric acid as composed of 2 equivalents of anhydrous acid and 3 of water; or more conveniently, in reference to the hydrogen unit, of 1 atom of anhydrous acid, and 1½ of water.

The ultimate components of nitric acid in its anhydrous state, and as it therefore exists in nitre, are—

	Atoms.	Equivalents.	Per Cent.
Nitrogen	1	14	26
Oxygen	5	40	74
Anhydrous Nitric Acid	1	54	100

In this state, however, the nitric acid cannot be insulated; in the liquid nitric acid, the water which is present takes the place of a base, and its composition, when of the greatest strength, is—

	Atoms.	Equivalents.	Per Cent.
Anhydrous Nitric Acid	1	54	80
Water	1½	13·5	20
Liquid Nitric Acid, sp. gr. 1·5	1	67·5	100

Nitric acid, when pure, is colourless, and extremely corrosive; it exhales fumes when exposed to air, and absorbs moisture, consequently diminishes in specific gravity, and increases in bulk. It tinges the cuticle of an indelible yellow, and causes it soon to peel off. It is decomposed by nearly all the metals and combustible substances, and is one of the most active oxydizing agents known. When passed through a red-hot tube, it is resolved into nitric oxide, oxygen, and water. It frequently has an orange-colour, in consequence of the presence of nitrous acid.

The common nitric acid of commerce generally contains traces of sulphuric acid and of potassa, and a very notable proportion of hydrochloric acid, derived from chloride of sodium contained in the nitre employed for its production. A very dilute solution of chloride of barium is not affected by pure nitric acid, but it is rendered turbid by the presence of sulphuric acid; nor is a dilute solution of nitrate of silver altered by pure nitric acid; but when it contains hydrochloric acid, a white cloud of chloride of silver is formed, which becomes brown by exposure to light. The presence of potassa or nitre, in nitric acid, may be learned by evaporation to dryness; the pure acid leaves no residue.

Nitric acid is scarcely employed in its concentrated state; it is, however, a very effective caustic, and would probably be an efficacious application to the bites of rabid and poisonous animals, its liquid form enabling it to penetrate into the wound, the surfaces of which would be thus killed and corroded, while its peculiar activity in the decomposition of animal matter renders it probable that it would act speedily upon the poison. Mr. Welbank recommends it as an escharotic in sloughing phagedænic ulcers, but it requires care in its application, and the protection of the surrounding parts by a coat of lard. (*Med.-Chirur. Trans.* IX. 69.)

Nitric vapour is sometimes employed for the destruction of contagious and infectious matter; it is easily produced by the action of sulphuric acid upon nitre, aided by a gentle heat; it is, however, much less certain in its operation than chlorine.

Acidum Nitricum Dilutum.	Diluted Nitric Acid.
℞ Acidi Nitrici, fluidunciam,	Take of Nitric Acid, a fluid ounce,
Aquæ destillatæ, fluiduncias novem;	Distilled Water, nine fluid ounces;
Misce.	Mix.

"One hundred grains of this diluted acid contain 14·3 of the concentrated acid, and consequently saturate about 31 grains of crystallised carbonate of soda; and by weight, their respective strengths are to each other exactly as 1 to 7: the specific gravity of the diluted acid is 1·080, and a fluidrachm contains nearly 8·5 grains of the concentrated acid, saturating 18·5 grains of crystallised carbonate of soda." (*Phillips.*)

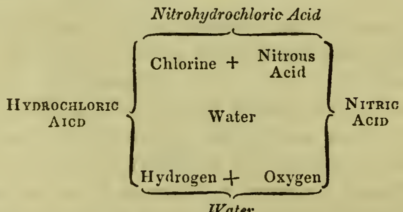
Dilute nitric acid may be given in doses of from ten to forty minims, in any proper vehicle, such as capillaire and water, or infusion of roses, or the common bitter infusions; for although the concentrated acid is decomposed by vegetable substances, the diluted acid produces no such effect. It is considered as an antiseptic tonic; and is useful in those cases of dyspepsia, in which the acid plan of treatment is indicated. It has been recommended in chronic hepatitis attended by dropsy. It was once considered as efficient in the cure of syphilis; although in such cases it may be occasionally useful as a tonic, it certainly possesses no influence over the disease, corresponding with that of mercury. In some cases of eruptions, and in ulcerations of the legs, an alterative course consisting of nitric acid and small doses of mercury, is said to have been of service: the acid may be given in the morning and at noon, and five grains of mercurial pill may be taken at bed-time; the bowels will generally be opened, and sometimes violently affected by this treatment, but these effects may be checked by opiates. It is doubtful whether nitric acid is preferable to the other mineral acids as an antiseptic and refrigerant.

As nitric acid dissolves uric acid as well as the phosphates, chemical physicians have sometimes preferred it as a lithontriptic, and have considered it applicable in cases in which mixtures of those substances are voided; but practice does not sanction the theory; and where the urine deposits a sediment consisting of the phosphates and of uric acid, it is usually symptomatic of disordered digestion or of some hepatic affection, and yields to acids with bitters and mild aperients. If, however, the sediment assumes the more decided symptoms of *gravel*, and is attended with uneasiness in the loins, and a constant pink deposit in the urine, great constitutional derangement is generally to be apprehended, and, in most instances, organic changes.

Nitric acid is applied externally to ill-conditioned sores or ulcers, in various states of dilution, depending upon the effects it produces, which are sometimes very beneficial; two or three drachms of the diluted acid to a pint of water may be used in the first instance, and the strength increased according to circumstances.—(For the toxicological history of this and other acids, see Christison, chap. iii.)

NITROHYDROCHLORIC ACID. *Nitro-muriatic Acid. Aqua Regia.*

When strong nitric and hydrochloric acids are mixed in the proportions of one part of the former to two of the latter, they become yellow, and acquire the power of dissolving gold; these changes arise from the evolution of chlorine, which, together with water and nitrous acid, are the results, as shown in the annexed diagram:—



Diluted nitrohydrochloric acid, externally applied, has been recommended as an alterative and stimulant, more especially in hepatic affections, and in deficient secretion of bile. The acid should be diluted in the proportion of two ounces to each gallon of water, or so as to produce a mixture as sour to the taste as strong vinegar; this should be applied daily with a sponge to the surface of the body, or used as a bath for the feet and legs. It generally produces a slight cuticular excitement, thirst, and a peculiar taste in the mouth; the bowels become affected, the pulse quickened, and the pain in the region of the liver, the headache, and the symptoms of morbid irritability under which such patients frequently suffer, gradually give way. We owe this introduction of chlorine or nitrohydrochloric baths to Dr. Scott, who long resided in India, and used them with great success. Upon the whole, however, the encomiums bestowed upon them are not justified by experience.

NUX VOMICA. *Semina.* The *seeds* of the *Strychnos Nux Vomica. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Apocynaceæ.

This species of strychnos is found on the coast of Coromandel, in Ceylon, and elsewhere in the East Indies. It is a low tree, with irregular branches, covered by a smooth ash-coloured bark. The wood is white, hard, and very bitter, especially that of the root. The leaves are opposite, short-stalked, oval, shining, smooth on both sides, from three to five-nerved, and from one and a-half to four inches long, and one to three broad. Flowers small, greenish-white, in small terminal corymbs. Calyx five-toothed, permanent; filaments very short, inserted over the bottom of the corolla; anthers oblong, half within the tube, and half without; ovary two-celled, with many ovules within each cell, attached to the thickened centre of the partition. Style the length of the tube of the corolla; stigma capitate; berry round, smooth, size of an apple, covered by an orange-coloured shell filled with white pulp. Seeds several, immersed in the pulp of the berry. The pulp is harmless, but the seeds highly poisonous; they are nearly round and flat, and about three-fourths of an inch diameter, and three-eighths thick, covered by a gray velvety pellicle, and horny within; of a dingy-white colour, and translucent.

The proximate principles of these seeds are, according to Pelletier and Caventou, strychnia and brucia, in combination with strychnic acid, wax, oil, gum, starch, and woody fibre. Their poisonous quality and medicinal powers are due to the presence of the alkaloid *Strychnia*, for the separation of which the following formula is given in the Pharmacopœia:—

Strychnia.	Strychnia.
℞ Nucis Vomicæ contusæ, libras duas,	Take of Nux Vomica, bruised, two pounds,
Spiritûs rectificati, congios tres,	Rectified Spirit, three gallons,
Acidi Sulphurici diluti,	Diluted Sulphuric Acid,
Liquoris Ammoniæ,	Solution of Ammonia,
Magnesiæ, singulorum quantum satìs sit;	Magnesia, of each, as much as may be sufficient;
Strychni nucem contusam cum spiritûs congio, per horam coque in retortâ, cui receptaculum aptatum est. Liquorem effunde, et quod restat cum altero spiritûs congio et spiritu recèns destillato, iterum et tertiò coque et liquorem effunde. Strychni nucem exprime, et ex liquoribus mixtis et colatis destillet spiritus. Quod restat ad idoneam extracti crassitudinem consume. Hoc in aquâ frigidâ liqua et cola. Liquorem leni calore consume ut syrupi crassitudinem	Boil the bruised nux vomica with a gallon of the spirit for an hour, in a retort, to which a receiver is fitted. Pour off the liquor, and again, and a third time boil what remains with another gallon of the spirit, and the spirit recently distilled, and pour off the liquor. Press the nux vomica, and let the spirit distil from the mixed and filtered liquors. Evaporate what remains to the proper consistence of an extract. Dissolve this in cold water, and filter. Evaporate the

habeat. Huic adhuc calenti magnesiam ad saturationem usque paulatim adjice, simùl agitans. Sepone per dies duos, tum liquorem supernatantem effunde. Quod restat linteo involutum exprime. Id in spiritu coque, tum cola, et destillet spiritus. Reliquo adjice aliquantulum acidi sulphurici diluti aquâ mixti, et leni calore macera. Sepone per horas viginti quatuor, ut in crystallos abeat. Has exprime et liqua. Denique his in aquâ liquatis ammoniam adjice, subindè agitans, ut demittatur strychnia. Hanc postremò in spiritu fervente liqua, et sepone ut puræ prodeant crystalli.

Nota.

Strychnia (*crystalli*). In alcohole fervente promptè liquatur; in aquâ non item. Igne liquescit; et si acrius urgeatur, tota consumitur. Viribus hæc induta violentis non temerè adhibenda est.

liquor by a gentle heat till it has the consistence of syrup. To this, while yet warm, gradually add the magnesia to saturation, shaking them together. Set aside for two days, then pour off the supernatant liquor. Press out what remains, wrapped in cloth. Boil it in spirit, then filter, and let the spirit distil. Add to the residue a very little dilute sulphuric acid, mixed with water, and macerate with a gentle heat. Set aside for twenty-four hours, that crystals may form. Press and dissolve them. Afterwards, to these, dissolved in water, add ammonia, frequently shaking them, that the strychnia may be precipitated. Lastly, dissolve this in boiling spirit, and set aside, that pure crystals may be produced.

Note.

Strychnia (*crystals*). It is readily soluble in boiling alcohol, but not in water. It melts by heat; and if more strongly urged, it is entirely consumed. Being endowed with violent powers, it is not to be rashly administered.

In the above somewhat confused process, the active principles of the nux vomica are extracted by the alcohol, and obtained in the residue of its evaporation; they consist chiefly, if not entirely, of strychnia, brucia, and strychnic acid. No effective means are used to separate the brucia, which, therefore, is precipitated, together with the strychnia, by the action of the magnesia on the mixed strychnates. This mixture of the alkaloids and magnesian salt, is then redigested in alcohol, by which the strychnia (and brucia) is dissolved; the resulting sulphate of strychnia is then crystallised and decomposed by ammonia, which precipitates the strychnia, and which is directed to be crystallised by the evaporation of its alcoholic solution.

Strychnia forms octoëdral and prismatic crystals, colourless when pure, and requiring between 6000 and 7000 parts of cold, and 2500 parts of boiling water for solution; the intensity of its bitterness is such as to render it perceptible in 600,000 times its weight of water. It is stated by Dumas to be almost insoluble in anhydrous alcohol and in pure ether. Spirit of wine of the specific gravity ·835 dissolves it, and deposits it in a granular form when rapidly evaporated, but in crystals by spontaneous evaporation. The statement of its ready solubility in *alcohol*, in the above Pharmacopœia Note, is not, therefore, quite correct. It has an alkaline reaction on vegetable colours, and neutralises and forms salts, chiefly crystallisable, with the acids. The equivalent of strychnia (on the hydrogen scale) appears, upon the authority of Liebig, to be 234; its ultimate elements are—

	Atoms.	Equivalents.	Per Cent.
Carbon	30	180	77·0
Hydrogen	16	16	6·8
Oxygen	3	24	10·2
Nitrogen	1	14	6·0
Strychnia	1	234	100·0

There are no very satisfactory tests of the presence of strychnia: as it usually occurs, it is reddened by nitric acid, but that change of colour depends either upon the presence of brucia, or of extractive matter, and does not occur with the pure strychnia obtained from the *Upas Tiente* of Java.

Medical Properties and Uses of Strychnia. The physiological effects of strychnia are of a very peculiar and dangerous character, and render extreme caution necessary whenever it is medicinally exhibited. It is placed by Dr. Christison among the *Narcotico-acrid* poisons. When strychnia is administered in *very* small doses (in a state of solution in a small quantity of a diluted acid), it acts as a tonic and diuretic; in the dose, for instance, of about one-thirtieth of a grain; but if the dose be somewhat increased, to the amount, for instance, of from one-sixteenth to one-tenth of a grain, it soon produces a disordered state of the muscular system. Mr. Pereira, in his *Lectures on Materia Medica* published in the *Medical Gazette* (XIX. 442), describes "a feeling of weight and weakness in the limbs, and increased sensibility to external impressions (of light, sound, touch, and variation of temperature), with depression of spirits and anxiety," as the usual precursory symptoms. "The limbs tremble, and a slight rigidity or stiffness is experienced when an attempt is made to put the muscles into action. The patient experiences a difficulty in keeping the erect posture, and, in walking frequently staggers. If, when this effect is beginning to be observed, you tap him suddenly on the ham when standing, you may frequently bring on a slight convulsive paroxysm, so that he will have some difficulty to prevent himself from falling. I have often, in this way, been able to recognise the effects of nux vomica on the muscular system, before the patient had experienced any particular symptoms. If the medicine be still persevered in, these effects increase, and the voluntary muscles are convulsed by very slight causes. Thus, when the patient inspires deeply, or attempts to walk, or turn in bed, a convulsive paroxysm is brought on. The sudden contact of external bodies also acts like an electric shock on him. The further employment of nux vomica increases the severity of the symptoms: the paroxysms now occur without the agency of any evident exciting cause, and affect him even when lying perfectly quiet in bed."

From these and other effects of strychnia, it has been inferred that its chief operation is upon the motor tract of the spinal chord; and it has been ascertained, in proof of this opinion, that its poisonous effects are not prevented by division of the spinal chord, or even by decapitation; whereas, on the other hand, the destruction of the spinal chord immediately causes the tetanic symptoms to cease, and, if part only of that chord be removed or destroyed, the convulsions cease in that part only of the body which receives its supply of nerves from the injured portion of the medulla spinalis. So far, therefore, neither the cerebrum nor cerebellum appear immediately concerned in its effects.

The extraordinary power of strychnia over the muscular system, and apparently independent of cerebral influence, led M. Fouquier to suggest it as a remedy in certain cases of paralysis, especially those unattended by evident organic lesion, such, for instance, as arise from the influence of lead and other poisons. It is most efficacious when administered in acid solution. Dr. A. T. Thomson recommends an acetate, formed by dissolving one grain of strychnia in one drachm of distilled vinegar, "so that six minims contain one-tenth of a grain of strychnia, the proper dose to commence with. In some habits, I have seen one-sixteenth of a grain produce tetanic twitchings, whilst, in others, I have given a grain and a half, without the smallest obvious effect. As soon as the tetanic twitchings become so severe as to affect the breathing, the medicine should be discontinued, and after some days again recommenced in smaller doses, if it be necessary to persist in its use." Strychnia has also been used in epilepsy, chorea, hysteria, and hypochondriasis. "I have seen it," says Mr. Pereira, "very serviceable in that shaking or trembling action of the muscles produced by habitual intoxication."

In all cases where strychnia is used, whether in paraplegia, and partial paralysis, or in those obscure and painful affections, constituting varieties of *Tic doloureux*, it requires to be employed with great circumspection; there is, however, no reason to regard it as a cumulative poison. It seldom produces any remarkable effect upon the pulse, and when administered in paralysis, its effects are first and chiefly observed in the paralysed parts. Warmth, creeping sensation, perspiration, and convulsive movements there first manifest themselves, and M. Magendie says that he has seen the affected side covered with an anomalous eruption, while the opposite side was free from it.

In some cases of amaurosis, independent of any apparent organic lesion, strychnia has been tried, but, hitherto, with uncertain results. In these cases it has been recommended to sprinkle it upon small blisters applied to the temples and eyebrows. The remedy is said to cause specks to be perceived in the eyes, especially in the affected one, and that the more of these, the better the prognosis.

All that has been said of strychnia, applies, of course, to the *nux vomica*, and to certain preparations of it: the dose of the powder of the nux vomica is two or three grains gradually increased. The *alcoholic extract*, in the dose of half a grain to a grain, at first night and morning, and then three or four times a day, has also been recommended. Tannin and astringents, and chlorine, iodine, and bromine, are said to be incompatible with strychnia, and to modify or impair its activity. Opium or hemlock may be resorted to, to allay its too-powerful effects.

The *Tinctura Nucis Vomicæ* of the *Dublin Pharmacopœia* is a good and simple form of this remedy, preferable, perhaps in almost all cases, to strychnia, and to the powder. It is made by digesting two ounces of finely-rasped nux vomica in eight fluid ounces of rectified spirit, for seven days. The dose is from five to ten drops twice or thrice a day. It is also sometimes used externally as a liniment or embrocation, mixed with the *Linimentum Saponis*, or *Linimentum Ammoniæ compositum.*

Poisoning with Strychnia. Nux vomica is occasionally resorted to as a poison, though the intensity of its bitterness is against its employment as an instrument of murder. Magendie found that half a drachm of the powder of *nux vomica* killed a dog in forty-five minutes; a grain and a half of the alcoholic extract killed another dog in seven minutes. Dr. Christison killed a dog in two minutes, by injecting a sixth part of a grain of *strychnia* dissolved in alcohol, into the chest; he adds, "I have seen a wild boar killed in the same manner, with a third of a grain, in ten minutes; and there is little doubt that half a grain thrust into a wound, might kill a man in less than a quarter of an hour."

The experiments which have been made on animals to ascertain the cause of death in these cases, tend to refer it to spasm of the thoracic muscles of respiration. When strychnia is administered in fatal doses, "the effects are very uniform and striking. The animal becomes agitated and trembles, and is then seized with stiffness and starting of the limbs. These symptoms increase till at length it is attacked with a fit of a violent general spasm, in which the head is bent back, the spine stiffened, the limbs extended and rigid, and the respiration checked by the fixing of the chest. The fit is then succeeded by an interval of calm, during which the senses are quite entire, and unnaturally acute; but another paroxysm soon sets in, and then another and another, till at length a fit takes place more violent than any before it, and the animal perishes suffocated. The first symptoms appear in sixty or ninety seconds, when the poison is applied to a wound. When it is injected into the pleura, I have known them to begin in forty-five seconds."

There seems to be no antidote to the effects of strychnia. The stomach should be evacuated as rapidly as possible, either by the pump, or by emetics of the sulphate of zinc or of copper; and in cases where the powdered nux vomica has been swallowed, the means of evacuating the stomach should be continued for some time, in consequence of the obstinacy with which it adheres to the inside of the stomach. Opium and hemlock may be used afterwards with a view of allaying the tetanic action.

I shall conclude this subject with an abstract of two cases of poisoning by nux vomica, quoted by Dr. Christison, from the *London Medical Repository* (xix. 456 and 448).

A young woman swallowed purposely, a drachm, mixed in a glass of wine: in fifteen minutes she was seized with pain and heat in the stomach, burning in the gullet, a sense of rending and weariness of the limbs, succeeded by stiffness of the joints, convulsive tremors, tottering in her gait, and at length violent and frequent fits of tetanus. Milk given after the tetanus began, excited vomiting. She was further affected with redness of the gums, inflammation of the tongue, burning thirst, and pain in the stomach. The pulse also became quick and the skin hot. Next day, though the fits had ceased, the muscles were very sore, especially on motion. The tongue and palate were inflamed, and there was thirst, pain in the stomach, vomiting, colic, and diarrhœa. These symptoms, however, abated, and on the fourth day disappeared, leaving her exceedingly weak.

The other case is related by Mr. Ollier. A young woman in a fit of melancholy took between two and three drachms of the powder in water. When the surgeon first saw her, half an hour afterwards, she was quite well: but going away in search of an emetic and returning again in ten minutes, he found her in a state of great alarm, with the limbs extended and separated, and the pulse faint and quick. She then had a slight and transient convulsion, succeeded by much agitation and anxiety. In a few minutes she had another, and not long afterwards a third, each about two minutes in duration. During these fits, the whole body was stiffened and straightened; the legs pushed out and forced wide apart;

no pulse or breathing could be perceived; the face and hands were livid, and the muscles of the former violently convulsed. In the short intervals between the fits she was quite sensible, had a quick, faint pulse, complained of sickness with great thirst, and perspired freely. A fourth and most violent fit soon succeeded, in which the whole body was extended to the utmost from head to foot. From this she never recovered; she seemed to fall into a state of asphyxia, relaxed her grasp, and dropped her hands on her knees. Her brows, however, remained contracted, her lips drawn apart, salivary foam issued from the corners of the mouth, and the expression of the countenance was altogether most horrific. The appearances after death were insignificant. The stomach was almost natural, the vessels of the brain somewhat congested, the heart flaccid, empty, and pale. In some few cases, the stomach and bowels have been found inflamed, showing, together with some of the previous symptoms, that nux vomica, in addition to its peculiar effects upon the nervous system, operates to a certain extent as an acrid poison.

The only disease which produces effects likely to be confounded with those resulting from this poison, is *Tetanus*, and when nux vomica has been given in small doses often repeated and gradually increased, it may induce symptoms exactly resembling tetanus from natural causes. In other cases, however, the diagnosis is obvious, for tetanus is unaccompanied by the symptoms of irritation which nux vomica often produces, the fits are slow in being formed, and it never proves so quickly fatal as large doses of the poison.

On the whole, in the intensity of its action and the smallness of the dose in which it may prove fatal, strychnia is perhaps only equalled by aconitina, and hydrocyanic acid: while, from the resemblance of the symptoms which follow its protracted use to those of a natural disease, it presents itself in a most formidable aspect, as a secret poison.

OLEA DESTILLATA. *Distilled Oils.*

Oleum Anisi . . .	Oil of Anise.
Oleum Anthemidis . .	Oil of Chamomile.
Oleum Carui . . .	Oil of Caraway.
Oleum Juniperi . . .	Oil of Juniper.
Oleum Lavandulæ . .	Oil of Lavender.
Oleum Menthæ Piperitæ .	Oil of Peppermint.
Oleum Menthæ Pulegii .	Oil of Pennyroyal.
Oleum Menthæ Viridis .	Oil of Spearmint.
Oleum Origani . . .	Oil of Marjoram.
Oleum Pimentæ . .	Oil of Pimenta.
Oleum Rosmarini . .	Oil of Rosemary.
Oleum Sambuci . . .	Oil of Elder Flowers.

Anisi, carui, et juniperi fructus, anthemidis, lavandulæ et sambuci flores, pimentæ baccas, rosmarini cacumina, reliquas autem herbas integras et recentes, adhibere oportet.	The fruit of anise, caraway, and juniper, the flowers of lavender and elder, the berries of pimenta, the tops of rosemary, and the entire and fresh herbs of the rest, should be employed.
Horum quodvis in alembicum immitte, et aquæ tantum adjice quantum ad id contegendum satis sit; tum in vas frigidarium amplum destillet oleum.	Put any one of these into an alembic, and add as much water as is sufficient to cover it, then let the oil distil into a large cold vessel.

The uses of these, and of the other essential or distilled oils included in the Materia Medica, will be found under the respective plants from which they are obtained.

The essential oils are, for the most part, ternary compounds of carbon, hydrogen, and oxygen, or *oxides of hydrocarbon;* a few of them contain no oxygen; of these the oil of lemons and turpentine may be taken as examples; they are *hydrocarbons:* their peculiarities, and some of the chemical views to which they have given rise, are elsewhere stated (*see* Camphora, p. 141).

With few exceptions, these oils are obtained by distilling the plant which affords them with water, when the greater portion of the oil is collected either upon, or at the bottom of the water, according to its specific gravity, some of these oils being heavier, but the greater number lighter than water, as shown in the following table, which, however, can only be regarded as giving approximate results, for the densities of these oils appear to vary with the mode of distillation, and the period of that process at which they are collected, and are also influenced by the state of the plant, the age of the oil, and its greater or less exposure to air; hence, probably, the discrepancy also of different authorities upon this subject.

Specific Gravities of the officinal Essential Oils.

Oil of Aniseed (English)	·9868
Oil of Aniseed (Foreign)	·9903
Oil of Cajuputi	·9263
Oil of Caraway	·9310 to ·9400
Oil of Chamomile (English, from flowers only)	·9083
Oil of Chamomile (Foreign)	·9289
Oil of Cinnamon	1·036
Oil of Cassia	1·071
Oil of Cloves	1·034 to 1·052
Oil of Dill	·994
Oil of Fennel	·997
Oil of Juniper (English)	·8688
Oil of Juniper (Foreign)	·8834 to ·9110
Oil of Lavender (English, from flowers only)	·8960
Oil of Lavender (English, from the whole herb)	·9206
Oil of Lemonpeel	·8569
Oil of Marjoram	·9090
Oil of Nutmegs	·948
Oil of Orangepeel	·8880
Oil of Pennyroyal	·9390 to ·978
Oil of Peppermint	·9070
Oil of Pimenta	1·021
Oil of Rosemary	·9118
Oil of Sassafras	1·094
Oil of Spearmint	·9394
Oil of Spike Lavender	·936
Oil of Turpentine	·8700

The quantity of essential oil from herbs is, in most cases, not materially affected by drying them: sometimes the odour of the oil is ameliorated, in others deteriorated, by previous desiccation; they are, however, commonly used in their fresh state by the distillers in the neighbourhood of London. The still and refrigeratory should be capacious, and a sufficiency of water used to cover the vegetable, previously cut or bruised, and not more than to fill two-thirds of the boiler. The fire should be moderate, and care taken to prevent empyreuma, and avoid the boiling over of the materials; distillation by the heat imparted by steam under moderate pressure is preferable to other methods. The process should be continued till the water comes over nearly insipid. When the oil is lighter than water the product is usually collected in what is termed an *Italian recipient;* it is a glass vessel having a pipe issuing from near its bottom, and of such a height as to suffer the water to run off before it is quite full; the oil remains in the vessel, and ultimately fills it. The oil and water may afterwards be completely separated, either by a siphon, or a separatory funnel. The water which distils over with the oil should be retained for a second distillation with the herb, as being already saturated with essential oil. When dry seeds are distilled for their essential oil, they are sometimes steeped in water, previous to distillation; so also are cloves, cinnamon, and pimenta; a portion of salt is also sometimes put into the still, to elevate the boiling-point of the water; these, however, are unnecessary proceedings.

These oils are called *volatile oils* in consequence of the readiness with which they rise in distillation along with the vapour of water; but when they are distilled *alone*, a process sometimes resorted to under the idea of purifying them, it is found that they require a much higher temperature than 212° for their evaporation, and that they suffer more or less change; they deposit resinous matter, and become less odorous and volatile: if, therefore, distilled with a view to their purification, they should always be mixed with water. Many of these oils, when kept, deposit benzoic acid and camphor. Exposed for a long time to light, they generally become pale or colourless, and in the contact of air they acquire viscidity, and some of them assume resinous characters. They are mostly soluble in alcohol and in ether: the alcoholic solutions are often known under the name of *essences.* They are sometimes adulterated with alcohol, which may be separated by agitation with water, and its quantity appreciated by their diminution of bulk: this adulteration is also indicated by a slight increase of temperature when they are mixed with water, and which is not observed when they are pure. Their adulteration with fixed oil is detected by the greasy stain which they leave when dropped upon paper and held to the fire; after the evaporation of the pure oil, under such circumstances, there only remains a slight discoloration, which may be written over with a pen and ink.

Some of these oils are obtained by *pressure*, as those of lemon, orange, and bergamotte, which exist in vesicles in the rind of the ripe fruit; others are of so delicate a nature as to be impaired by the most careful distillation, such as those of jasmine and tuberose. These are only used as perfumes, and are procured for that purpose by steeping the flowers in a perfectly inodorous fixed oil, which abstracts the odorous principle from the flower, and from which it may be transferred to alcohol, so as to form a spirituous essence. The same perfume cannot be obtained either by steeping the flowers in alcohol, or by distilling them either with it or with water.

In the Materia Medica, the essential oils rank among the most powerful stimulants, and as such they are both externally and internally employed. Some Pharmacopœiæ direct them in powders blended with sugar; but these should be left to extemporaneous prescription, in consequence of the loss of flavour which they sustain when kept: they have been called *elæosacchara*, and are prepared by triturating together half a drachm of the essential oil, with an ounce and a half of powdered sugar

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OLIBANUM. *Gummi-Resina.* The gum-resin of the *Boswellia serrata.* *Cl.* 10. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Burseraceæ.

This tree is a native of the mountains of Coromandel and Bundelkund. Leaves deciduous, alternate towards the top of the branches, unequally pinnate; leaflets opposite, serrated, oblong, obtuse, pubescent. The flowers are produced in axillary racemes, shorter than the leaves, numerous, pale pink. Calyx monopetalous, five-toothed, downy. Corolla composed of five oblong, spreading, exteriorly downy petals. Nectary a fleshy, crenulate, coloured cup, adhering to the calyx. Stamens ten, alternately shorter, supporting oblong anthers. Pistillum consisting of an ovate germen, cylindrical style, and trilobate stigma. Capsule smooth, three-sided, three-celled, each cell containing one perfect seed only, which is broad, cordate, and winged.

The finest olibanum is imported from the Levant, in yellowish-white and nearly opaque tears or drops, having a slight odour of turpentine, and a warm and bitterish taste. When burnt, it diffuses an agreeable fragrance. According to Braconnot it contains—

Volatile oil	8
Resin	56
Gum	30
Substance insoluble in water and in alcohol,	6
	100

Olibanum is an unimportant article of the Materia Medica: it has been administered in doses of from twenty to sixty grains, in gleets, but probably with little success; and though once celebrated as an expectorant, is now scarcely employed.

OLIVÆ OLEUM. Olive Oil. *Oleum è drupis expressum.* The expressed oil of the fruit of the *Olea Europœa.* *Cl.* 2. *Ord.* 1. Diandria Monogynia. *Nat. Ord.* Oleaceæ.

The olive-tree is a native of the South of Europe, and flowers from June to August: it is about twenty feet high, and sends off numerous branches, covered by gray bark: the leaves are firm, narrow, lance-shaped, entire, bright green on the upper side, and pale beneath, and stand in pairs on short footstalks: the flowers are small, white, numerous, and produced in clusters near the footstalks of the leaves: the calyx is tubular, and divided at the brim into four small erect deciduous segments; the corolla is a funnel-shaped petal, consisting of a short tube, about the length of the calyx, and divided at the border into four semiovate segments; the filaments are two, tapering, opposite, and crowned with erect anthers; the germen is round, and supports a short style, furnished with a bifid stigma; the fruit is oval.

The English market is almost exclusively supplied with olive oil from Italy. The oil is expressed from the pulp of the ripe fruit; that which first flows is called *virgin oil*, and is inodorous, and nearly insipid, having only a slight nut flavour. The residuary pulp, boiled and fermented, yields an inferior oil, which is mixed with that from the less perfect fruit, and exported, as well as some of the inferior oil, in casks, the former being exclusively preserved in large earthen jars, holding about twenty-four gallons each, or in glass flasks. The recent oil always deposits more or less sediment, although the greater portion is separated previous to its exportation.

The oil from Lucca, Florence, or Provence, is extremely bland and insipid; sometimes it has a slight acrimony and bitterness, said to arise from the unripe fruit. Its specific gravity is ·916. It congeals at about 38°, and begins to be decomposed when its temperature is elevated to between 500° and 600°. It becomes rancid on keeping, especially when originally of an inferior quality, or adulterated with poppy oil. This adulteration renders the oil less easily congealable, and prevents its solidification by pernitrate of mercury, which, added to the genuine oil, forms a concrete compound in the course of a few hours. Like the other fixed oils, it is a compound of elain and stearin, or margarin.

Olive oil is not much used as an internal remedy. In the dose of half an ounce to an ounce, it is gently aperient, and is sometimes administered as an antidote to certain poisons; but in such cases it is rarely useful. The superficial application of the bland fixed oils to the body, is said to prevent the reception of plague, and to mitigate the symptoms of those suffering from the disease. Such inunction has also been recommended in ascites, but there is no good evidence of its utility. As a vehicle for various active remedies, in the form of *liniment*, this oil is very useful; it impedes the evaporation of volatile substances, and retains other bodies in contact with the cuticle, so as to enable them to be absorbed. Upon this principle, oily liniments of ammonia, of opium, and of cantharides, are frequently prescribed.

The bark of the olive-tree is bitter and astringent, and has been used as a substitute for cinchona; the gum of the olive-tree has also been employed medicinally.

OPIUM (*οπος, juice*). *Capsulæ immaturæ succus concretus.* The concrete juice of the immature capsule of the *Papaver somniferum. Cl.* 13. *Ord.* 1. Polyandria Monogynia. *Nat. Ord.* Papaveraceæ.

Natural History of Opium. The somniferous poppy is an annual, flowering in June in Europe, and in February in India. The stem is glaucous, smooth, erect, and round, rising four or five feet in height; the leaves are large, simple, obtuse, lobed, crenated, and embrace the stem, on which they are placed alternately: the flowers are large and terminal; the calyx is formed of two smooth, ovate, bifid, concave leaves, which fall when the petals expand; the petals are four, roundish, large, entire, and somewhat undulated; the filaments are numerous, slender, short, and support erect anthers; the germen is globular and smooth; the stigma many-rayed; the capsule, which stands on a short pedicel, is globular, smooth, glaucous, and crowned with the persistent stigma; the seeds are small, gray, and numerous, and when ripe, escape through small apertures under the points of the stigma.

The poppy is probably an original native of Asia, though not an uncommon indigenous plant in the warmer parts of Europe. It was known to Homer, and was used in medicine by Hippocrates. Opium is chiefly prepared in Turkey, Persia, and India; but the plant is also abundantly cultivated in France and the South of Europe, on account of its seeds, from which a useful bland oil is procured by expression.

The method of obtaining opium is sufficiently simple; the young plants are set out in rows, about six inches distant from each other, and are at first plentifully watered. When six or eight inches high, a rich manure is applied, and when about to flower they are again profusely watered. The collection of opium commences when the seed-capsules are about half-grown. At sunset two or three longitudinal incisions are made in each capsule, care being taken to avoid reaching the internal cavity; the exuding juice is removed as fast as it concretes, put into earthen pots, and ultimately dried in the sun; it is then formed into spherical masses, covered with poppy or tobacco leaves, and more completely dried.

The following is the account of the mode of obtaining opium in Asia Minor. "A few days after the flower has fallen, men and women repair to the fields, and cut the head of the poppy horizontally, taking care that the incisions do not penetrate the internal cavity of the shell. A white substance immediately flows out and collects in tears on the edges of the cuts. In this state the field is left for twenty-four hours, and on the following day the opium is collected with large blunt knives. Each head furnishes opium once only, and that to the extent of a few grains. The first sophistication which it receives is that practised by the peasants who collect it, and who lightly scrape the epidermis from the shell, to augment the weight. This operation adds about one-twelfth of foreign matters. Thus collected, opium has the form of a glutinous and granular jelly. It is deposited in small earthen vessels and beat up with saliva; when asked why water was not employed instead of saliva, the answer was that water caused it to spoil. It is afterwards enveloped in dry leaves, and in this state is sold. The seeds of those poppies which have yielded opium are equally good for sowing the following year." (M. CH. TEXIER, as quoted by Mr. PEREIRA, *Med. Gaz.* XVIII. 819.)

Several varieties of opium are met with in commerce. That which is most prized is the *Turkey*, *Smyrna*, or *Levant opium*. It is found in the European market in flattish cakes, sprinkled with pieces of dried leaves, and with the seed capsules of some species of *Rumex*. It should be of a rich brown colour when recently cut, and of a tough consistency, and a tolerably smooth and uniform texture. After exposure to air, it becomes blackish, and harder. Its peculiar narcotic smell should be strong and fresh, and unaccompanied by any burnt odour. It taste is bitter, and slightly warm and acrid. Those pieces which are very soft, full of herbaceous impurities, containing patches of a very dark-brown or black extract, of an empyreumatic odour, or not smelling duly narcotic, are in general adulterated; and it is not uncommon to find stones, sand, bullets, and other impurities in masses even of the best opium. When this opium is carefully dried it becomes brittle, and affords a yellow-brown powder. It burns with flame, and exhales an odour in which may be traced some resemblance to that of animal matter. Its specific gravity is about 1·3.

A large quantity of opium is made in India: that which is found in our market under the name of *East India opium* is generally darker coloured and less pure than the Turkey opium; it has less of the narcotic odour, and smells, and tastes, and looks as if it had been injured by fire. But of the genuine Indian opium, little or none is brought to this country; about one-third is sent to the Eastern Islands, and two-thirds to Canton; it is rigidly prohibited in China, so that the whole of it is smuggled into that country. In the year 1829-30, between 16,000 and 17,000 chests of Indian opium are said to have been imported into China, each chest containing about 133 pounds. The Chinese use it chiefly for smoking, and prefer it to Turkey opium; they, however, also import a considerable quantity of the latter. The principal varieties of Indian opium are *Malwa* and *Bengal* opium: the former is in small cakes of a dark brown colour and resinous fracture; the latter in balls of about three and a half pounds' weight, of a softish consistence, and having a strong and pure taste and odour of opium.

Egyptian opium is in small flat cakes of a peculiar reddish colour, and having less of the opium odour than the other varieties.

Constantinople opium is in large and small cakes; the former of good quality; the latter covered with poppy leaf; less odorous, and more mucilaginous.

Persian opium is in small cylindrical sticks about six inches long and half an inch in diameter. "Each one is enveloped in a smooth shining paper, and tied with cotton; its colour is similar to that of Soccotrine aloes. It has the opiate odour stronger than that of the Egyptian kind, but less than Smyrna opium, and mixed somewhat with a musty odour; its taste is intensely bitter. It is commonly termed Persian opium, but the specimens I received came from Trebizond. It is considered an inferior kind." (*Pereira.*)

Chemical and Pharmaceutical History of Opium. The analyses by which the proximate principles of opium have been separated and identified are well calculated to show the recent improvements in this department of organic chemistry, and to illustrate the importance and practical utility of such researches. There are certain substances in opium common to it and some other vegetable products; and there are others peculiar to it, and upon which its medical virtues depend; so that by separating these, its active principles may be obtained in a distinct form, and the relative value of different samples accurately determined. Minute quantities of volatile and of fixed oil, gum, resin, extractive, caoutchouc, and small portions of inorganic salts, are combined in opium with a peculiar crystallisable principle, which has been termed *narcotine*, and with several alkaloids, of which the most important is *morphia;* the others have been termed codeia, narceia, meconia, thebaia or paramorphia, and they are saturated, or supersaturated, in the crude opium, by *meconic acid.*

I shall now describe the modes of separating these several substances, and mention such of their properties as are most important.

1. Narcotina is a leading ingredient in several varieties of opium; its medical powers have not been accurately ascertained; by some it is regarded as nearly inert; by others it is considered as the stimulant and exciting principle of opium. It may be obtained by digesting powdered opium in ether, which takes up the narcotine with some of the less important principles, from which it may be freed by crystallisation. When purified, it forms prismatic crystals insoluble in cold water, and very sparingly soluble in boiling water, and soluble in hot alcohol, ether, and fat oils. It is tasteless and inodorous, soluble in dilute acids, and yields bitter compounds, which are difficultly obtained in crystals, for when evaporated, they are mostly decomposed into acid and narcotina, and crystals of the latter only separate. Its most definite salt is the hydrochlorate. Its alkaline characters, however, have not been satisfactorily established. Its equivalent may be assumed as = 370, and its ultimate components are, according to the analysis of Liebig,—

	Atoms.	Equivalents.	Per Cent.
Carbon	40	240	65·0
Hydrogen	20	20	5·4
Oxygen	12	96	25·9
Nitrogen	1	14	3·7
Narcotina	1	370	100·0

2. Morphia. There are several processes by which this alkaloid may be obtained, and among them that of the Pharmacopœia. The simplest and the best is the following, proposed by Drs. Robertson and Gregory. Chloride of calcium is added to a strong aqueous solution of opium to precipitate the acids by which the alkaloids are held in solution; it is then filtered and evaporated to the consistency of syrup, and set aside to crystallise; the crystals are strongly pressed to squeeze out the mother liquor, which contains narcotine and other impurities. The pressed crystals are then purified by solution, crystallization, and the action of animal charcoal, till they are obtained colourless; they consist of the hydrochlorates of morphia and codeia: they are dissolved in hot water, and ammonia is added, which throws down morphia, and which, being separated upon a filter, may be redissolved in boiling alcohol and obtained in crystals.

The liquor from which the morphia has been precipitated contains codeia, together with hydrochlorate of ammonia and some morphia; it is to be evaporated till it crystallises, and the crystallised mass dissolved in a small quantity of water and decomposed by excess of a solution of caustic potassa; codeia is thrown down, and when redissolved in ether, may be obtained in crystals.

Morphia, as crystallised from its alcoholic solution, is in small prismatic crystals of a bitter taste, the primary form of which is a right rhombic prism. It is nearly insoluble in cold water; soluble in about 100 parts of boiling water, and in 40 of cold, and 30 of boiling anhydrous alcohol: it is nearly insoluble in ether, hence the use of that menstruum in separating it from narcotina. Morphia is soluble in potassa and soda, but only to a very small extent in ammonia; hence the advantage of using the latter alkali in its precipitation. When heated it fuses, then takes fire and burns with a reddish flame, leaving a bulky coal which may be consumed without residue. The saturating equivalent of morphia is 284, and it consists of—

	Atoms.	Equivalents.	Per Cent.
Carbon	34	204	71·83
Hydrogen	18	18	6·33
Oxygen	6	48	16·90
Nitrogen	1	14	4·94
Anhydrous Morphia	1	284	100·00

In its usual crystallised state it includes 2 atoms of water, and consists, therefore, of—

	Atoms.	Equivalents.	Per Cent.
Anhydrous Morphia	1	284	94·04
Water	2	18	5·96
Crystals of Morphia	1	302	100·0

The *salts of morphia* are mostly crystallisable, bitter, narcotic, and obtained by dissolving morphia in diluted acids. They afford precipitates of morphia, on the addition of ammonia and of the carbonates of potassa and soda. They afford precipitates with tannic acid and infusion of galls, which are redissolved by acetic acid. When dropped into a solution of iodic acid, they render it reddish-brown, and iodine is evolved: they are reddened by nitric acid; and form a blue compound when added to a strong solution of perchloride of iron.

The other alkaloids have not as yet been used in medicine; they are contained in opium in variable quantities, and do not appear essentially to contribute to its medical virtues, *codeia*, perhaps, excepted.

The relative quantity of morphia contained in the different varieties of opium is extremely variable. The average in fine Turkey opium is about 8 per cent.; and of narcotina about 4 per cent. One ounce of hydrochlorate of morphia is considered as equivalent in value to a pound of the best opium. The other kinds of opium generally contain less morphia, and many of them more narcotina, than the Turkey opium.

3. Meconic Acid. This is the acid, or one of the acids, with which the alkaloids of opium are united, for they appear to be partly also in the state of sulphates. It is inert as a medicine. One of its characteristic properties, as also of its salts, is, that when added to solutions of the persalts of iron a deep blood-red colour is produced, and by this test

opium may sometimes be recognised when in quantities so small as to render the morphia of very difficult detection. But an analogous change of colour is produced by several other substances upon these salts of iron, so that the test cannot be relied on unless verified by others.

The following are the *pharmaceutical formulæ of opium* in the present Pharmacopœia.

MORPHIÆ HYDROCHLORAS.

℞ Opii concisi, libram,
Plumbi Chloridi crystallorum, uncias duas, vel quantum satìs sit,

Carbonis Animalis purificati, uncias tres cum semisse,
Acidi Hydrochlorici,
Aquæ destillatæ,
Liquoris Ammoniæ, singulorum quantum satìs sit;

Opium in aquæ destillatæ octariis quatuor macera per horas triginta, et contunde; deinde per horas alteras viginti digestum exprime. Quod restat, ut saporis expers sit, iterùm et tertio in aquâ macera, idque totiès contunde et exprime. Liquores mistos calore gradûs 140^{mi}. ad syrupi crassitudinem consume. Tum aquæ destillatæ octarios tres adjice et, ubi fæces omnes subsederint, liquorem supernatantem effunde. Huic plumbi chloridi uncias duas in aquæ destillatæ ferventis octariis quatuor priùs liquatas gradatìm adjice, vel quantum satìs sit, donec nihil ampliùs demittatur. Liquorem effunde et quod restat aquâ destillatâ sæpiùs affusâ lava. Deinde liquores inter se mistos, leni calore, ut ante, consume, et sepone ut fiant crystalli. Has linteo comprime, tum in aquæ destillatæ octario liqua, et cum carbonis animalis unciâ cum semisse, calore gradûs 120^{mi}. digere, tum cola. Denique, carbone eloto, cautè liquores consume ut puræ prodeant crystalli. Liquori effuso, unde crystalli primò separatæ sint, aquæ octario priùs addito, gradatìm instilla, subindè agitans, liquoris ammoniæ quantum satìs sit ad omnem morphiam demittendam. Huic aquâ destillatâ lotæ adjice acidum hydrochloricum, ut saturetur: deindè cum carbonis animalis unciis duabus digere, et cola. Denique, carbone omni eloto, cautè liquores consume, ut puræ prodeant crystalli.

HYDROCHLORATE OF MORPHIA.

Take of Opium sliced, a pound,
Crystallised Chloride of Lead, two ounces, or as much as may be sufficient,
Purified Animal Charcoal, three ounces and a-half,
Hydrochloric Acid,
Distilled Water,
Solution of Ammonia, of each as much as may be required;

Macerate the opium in four pints of distilled water for thirty hours, and bruise it; afterwards digest it for twenty hours more and press it. Macerate what remains again, and a third time, in water, that it may become free from taste, and as often bruise and press it. Evaporate the mixed liquors with a heat of 140°, to the consistence of syrup. Then add three pints of distilled water, and when the dregs have subsided pour off the supernatant liquor. Gradually add to this two ounces of chloride of lead previously dissolved in four pints of boiling distilled water, or as much as may be sufficient, till nothing more is precipitated. Pour off the liquor and wash what remains frequently with distilled water. Then evaporate the mixed liquors as before, with a gentle heat, that crystals may be formed. Press these in a cloth, then dissolve them in a pint of distilled water, and digest with an ounce and a half of animal charcoal, in a heat of 120°, and strain. Lastly, having well washed the charcoal, evaporate the liquors cautiously that pure crystals may be produced. To the liquor poured off from the crystals first separated, a pint of water being previously added to it, gradually drop in, frequently shaking it, as much solution of ammonia as may be sufficient to throw down all the morphia. To this, washed with distilled water, add the hydrochloric acid, that it may be saturated; afterwards digest it with two ounces of animal charcoal, and strain. Lastly, the charcoal being thoroughly washed, cautiously evaporate the liquors, that pure crystals may be produced.

Nota.

Morphiæ Hydrochloras (*crystalli*). In aquâ liquatur. Quod ex hoc liquore per argenti nitratem demittitur, id neque ammoniâ nisi suprà modum additâ, neque acido hydrochlorico aut nitrico adjecto, omne dissolvitur.

Note.

Hydrochlorate of Morphia (*crystals*). It is soluble in water. That which is thrown down from this solution by nitrate of silver is not entirely dissolved either by ammonia, unless added in excess, or by the addition of hydrochloric or nitric acid.

In the preceding process the acids of the opium, instead of being precipitated, as in Gregory's process, in combination with lime, are thrown down combined with oxide of lead; the resulting hydrochlorate of morphia is decomposed, as in the former process, by ammonia, and the precipitated morphia redissolved by hydrochloric acid, and crystallised, having been previously decoloured by the agency of animal charcoal. It seems, however, doubtful whether in this process sufficient precautions are taken to ensure the purity of the salt of morphia, and the total absence in it, of lead; no alcohol is employed, and consequently the purity of the morphia itself becomes questionable. This salt of morphia cannot, however, be prepared conveniently or economically upon the small scale; it is always, therefore, made by and purchased of the wholesale manufacturers; it might have been placed in the *Materia Medica* of the Pharmacopœia, with more explicit directions than those in the above *Note*, for determining its purity and uniformity of composition.

Hydrochlorate of morphia is generally represented as an anhydrous salt. It forms soft plumose crystals, very bitter, and soluble in about 20 parts of cold water. When its hot saturated solution cools, it concretes into a crystalline mass. This salt consists of—

	Atoms.	Equivalents.	Per Cent.
Morphia	1	284	88·48
Hydrochloric acid	1	37	11·52
Hydrochlorate of Morphia	1	321	100·00

Morphia.

℞ Morphiæ Hydrochloratis, unciam,
Liquoris Ammoniæ, fluidrachmas quinque,
Aquæ destillatæ, octarium;

Liquori ammoniæ cum aquæ destillatæ unciâ, morphiæ hydrochloratem in aquæ octario priùs liquatam adjice, simùl agitans. Quod demissum est aquâ destillatâ lava et leni calore exsicca.

Nota.

Morphia. Aquâ frigidâ minimè, fervente paululùm, alcohole facillimè liquatur. Hic liquor, teste curcumâ, vim alkalinam exhibet, et ubi spiritus destillaverit, in crystallos abit, quæ igne

Morphia.

Take of Hydrochlorate of Morphia, an ounce,
Solution of Ammonia, five fluid drachms,
Distilled Water, a pint;

To the solution of ammonia with an ounce of distilled water, add the hydrochlorate of morphia previously dissolved in a pint of water, shaking them together. Wash what is thrown down with distilled water, and dry it by a gentle heat.

Note.

Morphia. Very little soluble in cold water, little in boiling water, very readily in alcohol. This solution, tested by turmeric, exhibits an alkaline action, and when the spirit has been distilled totæ pereunt. Adjecto acido nitrico, primùm rubet, deindè flavet. Tinctura ferri sesquichloridi cœruleum colorem inducit. Chlorinium, ammoniâ additâ, fusco colore sales ejus inficit, qui, ubi plùs chlorinii addideris, effugit. Demittitur etiam morphia ex suis salibus per liquorem potassæ, quo suprà modum adjecto iterùm dissolvitur.

from it, it yields crystals which are totally destroyed by heat. On the addition of nitric acid, it first reddens, then becomes yellow. Tincture of sesquichloride of iron gives it a blue colour. Chlorine, ammonia being added, gives its salts a brown colour, which vanishes when you add more chlorine. Morphia is also thrown down from its salts by solution of potassa, which, added in excess, redissolves it.

What has been above stated respecting morphia renders further remarks upon this formula and note unnecessary.

MORPHIÆ ACETAS.

℞ Morphiæ, drachmas sex,
Acidi Acetici, fluidrachmas tres,
Aquæ destillatæ, fluiduncias quatuor;

Acidum aquâ misce et morphiæ superinfunde ad saturationem. Leni calore exhaletur liquor ut fiant crystalli.

ACETATE OF MORPHIA.

Take of Morphia, six drachms,
Acetic Acid, three fluid drachms,
Distilled Water, four fluid ounces;

Mix the acid with the water, and pour them upon the morphia to saturation. Let the liquor evaporate by a gentle heat that crystals may be formed.

NOTA.

MORPHIÆ ACETAS (*crystalli*). In aquâ facillimè liquatur. Cætera se habent quemadmodum de morphiâ dictum est.

NOTE.

ACETATE OF MORPHIA (*crystals*). It is very readily soluble in water. Its other properties are such as have been stated of morphia.

Acetate of morphia requires to be cautiously crystallised in consequence of the ease with which part of the acid may be expelled; it forms acicular crystals, readily soluble in water, and less so in alcohol. The composition of this salt has not been determined experimentally, nor has it been ascertained whether its crystals contain water: if anhydrous, it probably consists of—

	Atoms.	Equivalents.	Per Cent.
Morphia	1	284	84·77
Acetic Acid	1	51	15·23
Acetate of Morphia	1	335	100·00

EXTRACTUM OPII PURIFICATUM.

℞ Opii concisi, uncias viginti,
Aquæ destillatæ, congium;

Opio adjice exiguum aquæ, et macera per horas duodecim, ut mollescat; tum, instillatâ paulatim reliquâ aquâ, tere donec quam optimè misceantur, et sepone, ut fæces subsidant; dein liquorem cola, et ad idoneam crassitudinem consume.

PURIFIED EXTRACT OF OPIUM.

Take of Opium, sliced, twenty ounces,
Distilled Water, a gallon;

Add a little water to the opium, and macerate for twelve hours, that it may soften; then, the remaining water being gradually poured in, rub them till they are very well mixed, and set by, that the dregs may subside; afterwards strain the liquor, and evaporate to a proper consistence.

This extract, when properly prepared, is nearly inodorous, of a deep brown colour, and bitter taste. The odorous principle of opium is volatile, and apparently inert, for the distilled water of opium possesses no poisonous or narcotic properties, although it has the peculiar odour of the drug. Where it is required to administer it in a solid form, common opium is generally preferable to this extract. 112 pounds of opium yield between 70 and 80 pounds of the extract, but a considerable residue of morphia may be obtained from the *dregs*.

Tinctura Opii.	Tincture of Opium.
℞ Opii duri contriti, uncias tres,	Take of hard Opium, powdered, three ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

This tincture varies in depth of colour according to the quality of the opium with which it has been prepared: it is generally deep brown, and should smell strongly of opium. Its specific gravity, when prepared as above, Mr. Phillips states to be 0·952, and that about 29 minims contain 1 grain of solid matter. Proof spirit is a much better solvent of opium than cold water, for the latter dissolves less than three-sevenths of the opium, whereas proof spirit, as I found in preparing the tincture, dissolves more than two-thirds of it.

This tincture is generally sold under the name of *laudanum*, but abroad, and especially in Germany, a stronger spirituous solution of opium than the preceding, and flavoured with aromatics, is used under that name. The above is a convenient preparation of opium, either where a large dose is required, in its most active state, or where it is necessary to administer it in very small and divided portions. It may be given in almost any vehicle, but it is as well to avoid combining it with alkalies and metallic salts, by which morphia is either precipitated or enters into new combinations. The acids, as usually employed in medicine, are perfectly compatible with it; and acid tinctures of opium have sometimes been preferred to other formulæ. Among these, the *acetic tincture of opium* has been supposed to act as a more direct sedative than opium itself; the celebrated *black drop* is probably a compound of this kind; it was originally made, about a century ago, by Edward Runstall, of Bishop Auckland, in Durham. It is said to be prepared by slicing half a pound of opium, and boiling it with an ounce and a half of nutmeg, and half an ounce of saffron, in four pounds of verjuice; then adding a quarter of a pound of honey, and two tablespoonsful of yeast; this compound is allowed to ferment for six weeks in a warm place, after which it is decanted, filtered, and bottled, adding a little sugar to each bottle. Were this recipe correct, the black drop would contain an acid salt of morphia, which is the case, as, when diluted with water, and tested by litmus, it displays acid properties. The discovery, however, of morphia, and the introduction of its salts, has rendered this and similar preparations of opium much less important than formerly.

Vinum Opii.	Wine of Opium.
℞ Extracti Opii purificati, uncias duas cum semisse,	Take of purified Extract of Opium, two ounces and a half,
Cinnamomi contusi,	Cinnamon, bruised,
Caryophylli contusi, singulorum drachmas duas cum semisse,	Cloves, bruised, of each, two drachms and a half,
Vini Xerici, octarios duos;	Sherry Wine, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

This is one of the forms of *laudanum*, and closely resembles the *Laudanum Liquidum Sydenhami* of the old Pharmacopœia, which, however, was stronger, and contained saffron. "This preparation differs from the *Tinctura Opii*, not only in containing aromatics, but also in the use of purified opium. Various circumstances render it difficult to form an estimate of the comparative powers of these preparations; they probably differ but little, for respectable authorities agree in representing their doses as similar. The *Vinum Opii* must be less disagreeable to most persons than the tincture, not only on account of the aromatics which it contains, but because the opium, during purification, loses its peculiar disagreeable smell and taste." (*Phillips.*)

Confectio Opii.	Confection of Opium.
℞ Opii duri contriti, drachmas sex,	Take of hard Opium, powdered, six drachms,
Piperis longi, unciam,	Long Pepper, an ounce,
Zingiberis, uncias duas,	Ginger, two ounces,
Carui, uncias tres,	Caraway, three ounces,
Tragacanthæ contritæ, drachmas duas,	Tragacanth, powdered, two drachms,
Syrupi, fluiduncias sedecim;	Syrup, sixteen fluid ounces;
Contere simùl in pulverem subtilissimum et in vase operto conserva. Quotiès autem confectione utendum est, syrupi calefacti fluiduncias sedecim adjice et misce.	Rub the dry ingredients together to a very fine powder, and keep it in a close vessel. And whenever the confection is to be used, add sixteen fluid ounces of hot syrup, and mix.

This confection is a convenient form where small doses of opium are required, conjoined with aromatics, as in the treatment of diarrhœa, in atonic gout, and some forms of chronic rheumatism. From ten to thirty or forty grains are given for a dose, rubbed up with chalk mixture, camphor mixture, or any of the aromatic waters.

Emplastrum Opii.	Plaster of Opium.
℞ Opii duri contriti, unciam dimidiam,	Take of hard Opium, powdered, half an ounce,
Abietis Resinæ contritæ, uncias tres,	Resin of Spruce Fir, powdered, three ounces,
Emplastri Plumbi, libram,	Lead Plaster, a pound,
Aquæ, fluiduncias octo;	Water, eight fluid ounces;
Emplastro liquefacto abietis resinam, opium, et aquam adjice, et lento igne decoque, donec omnia in idoneam crassitudinem coëant.	Add the resin of the spruce fir, the opium, and the water to the melted plaster, and with a slow fire boil down until all unite into a proper consistence.

Besides the above, there are several other formulæ in the Pharmacopœia, into which opium enters, and which are noticed elsewhere, such as the *Enema Opii*, the *Linimentum Opii*, the *Pilulæ Ipecacuanhæ compositæ*, the *Pilulæ Saponis compositæ*, the *Pilulæ Styracis compositæ*, the *Pulvis Cretæ compositus cum Opio*, the *Pulvis Ipecacuanhæ compositus*, the *Pulvis Kino compositus*, and the *Tinctura Camphoræ composita.*

Medical Properties and Uses of Opium, &c.—Opium stands at the head of the narcotics, sedatives, and anodynes, and is a remedy of extreme importance; it is one, however, which, from various causes, requires considerable care and management in its administration; there are many diseases in which it is decidedly improper, or, as it is said, contra-indicated; there are others in which the symptoms favourable to its employment are conjoined with others which render it objectionable, if not inadmissible; and, lastly, it is a medicine more liable than almost any other to be modified in its effects by idiosyncracy.

With respect to the *modus operandi* of opium, little is certainly known; by some it has been regarded as acting solely through the medium of the nerves, by others through the blood, and there are experiments in favour of both hypotheses. In proof of the actual absorption of opium, it has been said that the blood and the secretions are often imbued with its odour, and that if the odorous principle of opium be absorbed, its narcotic principles are probably absorbed also; indeed, Baruel states that he detected morphia in the blood and urine of a person poisoned by laudanum; but others have searched for it under the most favourable circumstances without success. Of the influence of opium upon the sensorium there needs no further proof than common experience; how it affects the nervous system, will be more obvious in the sequel.

The apparent effect of small doses of opium is often that of a stimulant, rather than a sedative. It quickens the pulse, exhilarates the mind, produces headache, thirst, and heat of the body. But these effects are followed by a peculiar quiescent state of the system, which is more apparent after a full dose, when the stimulating power of opium is frequently unobserved. The pulse is then rendered full and slow, the skin warm and moist, the mind tranquil, and pain is allayed. Sometimes a quiet sleep follows, and, on awaking, the person feels animated and refreshed. But it frequently happens that the sleep is broken and disturbed by disagreeable dreams; and, instead of refreshment, languor, giddiness, nausea, and drowsiness succeed. In other cases a medium dose of opium produces a tranquil state of body and of mind, without the smallest tendency to sleep, and without subsequent debility or exhaustion. The cuticular secretion is generally increased by opium, and sometimes considerably; but the other secretions are more or less diminished; the bowels, especially, become constipated, and the urine smaller in quantity than usual. Bearing in mind these effects of opium, its value in disease must be obvious, as allaying pain, inducing sleep, and checking inordinate secretions.

In febrile diseases, opium is a useful palliative where there are no high inflammatory symptoms. In typhoid fevers it allays irritability and watchfulness, quiets many of the nervous symptoms, prevents inordinate relaxation of the bowels, and tends, in combination with alcoholic and ammoniacal stimulants and bitters, to support the general powers of the system. It is contra-indicated when the skin is hot and dry, or when sopor or coma have supervened. In intermittent fevers, and especially in those which long resist the curative power of cinchona, it has been found that putting the system under the influence of opium, at the accession of the fit, has much accelerated its cure by the ordinary methods.

In many inflammatory diseases opium may occasionally be resorted to for the purpose of alleviating particular symptoms, especially violent pain, spasmodic affections, or excessive discharges. It has also been employed, in conjunction with copious bleeding, as an occasional means of allaying inflammatory action; in such cases, a full dose of opium is administered, and, if successfully, it determines to the skin, allays irritability, and induces quiet and refreshing sleep, provided proper adjuncts be at the same time resorted to.

In obstinate, irritating, and spasmodic coughs, where inflammatory action is not predominant, an opiate at night is almost always palliative, and often curative: sometimes inflammatory action is kept up by the mere exertion of coughing; and, in such cases, that which checks the cough will diminish the tendency to inflammation.

In eruptive diseases attended by typhoid fever, and in those cases of small pox especially in which convulsions precede the eruption, in putrid sore throat, in scarlet fever, and in all diseases attended by nervous debility, opiates are occasionally beneficial; but they must be most cautiously given, particularly in reference to the state of the bowels. In nearly all spasmodic or convulsive diseases, the use of opium may be said to be indicated; but it often requires the aid of aperients, and occasions mischief, if the free action of the bowels is interfered with.

In rheumatism, both acute and chronic, opium is an important remedy, as relieving the excruciating and wearing pains of those disorders. In these cases, and especially in the acute form of the disease, it is combined with diaphoretics; and in chronic rheumatism similar combinations may be used, such as opium with small doses of ipecacuanha, emetic tartar, and calomel. The following formula is effectual in allaying rheumatic pains, especially when they come on with increased severity, as is often the case, upon getting warm in bed, or after the first sleep:—

℞ Opii,
Hydrargyr. Chloridi, āā gr. iv.
Antimonii Potassio-tartratis, gr. j.
Extract. Conii, ℈ss.
M. divide in pilulas viiij. Sumantur duæ hora decubitûs
et repetentur quartis vel sextis horis.

Where rheumatic and spasmodic pains are conjoined, as is not unfrequently the case, and where the attacks are periodical, opium, calomel, or blue pill, quinia, and other tonics, and an occasional warm aperient, are remedies that rarely fail of success. But in obstinate chronic rheumatism, confined to some one joint or muscle, the treatment by a brisk emetic and local stimulants is most to be depended upon.

In certain dyspeptic states of the stomach attended by heartburn, and in the ordinary forms of pyrosis, and, generally, in irritable stomach, opium and tonics may often be administered with advantage, and improve the appetite, when given an hour or two before dinner, as in the following formula:—

℞ Quiniæ disulphatis, gr. ij.
Tinct. Aurantii, f℥j.
Acid. Sulphur. dilut. ♏v.
Tinct. Opii, ♏x.
Infus. Cascarillæ, f℥x.
M. fiat haustus horâ ante prandium sumendus.

In common colic, and, above all, in *colica pictonum*, opium is successfully used; and in visceral diseases, attended by pain, it is often resorted to as a palliative. In the irritation of calculi in the kidneys, ureters, or bladder, it is often the only means of securing a little rest; but here it requires cautious attention to the state of the bowels, and especially of the urine, for the latter is sometimes so much diminished in quantity by the influence of opium, as to precipitate an additional proportion of sabulous matter. In cases of diseased prostate, irritable bladder, and painful affections of the rectum, a suppository of two or three grains of opium is sometimes the best mode of applying the remedy. Large doses of opium have also been found effectual in the treatment of diabetes, and in that of uterine hæmorrhage.

It would be irrelevant to the object of this work further to pursue this extensive, and, indeed, almost endless subject; I must, therefore, content myself with referring to writers on the Practice of Physic and Surgery generally for details respecting the employment of opium, and the precautions under which it requires to be administered. In prescribing opium, much will often depend upon the selection of its proper forms, vehicles, and combinations. It acts more slowly and continuously when given in substance than in solution; much will also depend upon the extent to which it is diluted, and the adjuncts with which it is blended. Where a powerful and immediate effect is required, as in cases of great pain or exhaustion, of violent spasm, or excessive irritability, the *tincture* is, generally speaking, the most effective preparation. It has already been stated that twenty minims of the tincture are usually considered as equivalent to one grain of solid opium; but from the state in which it is exhibited, the effect of the former is distinct from that of the latter. To a person not habituated to opium, or for whom it is prescribed for the first time, ten minims in an ounce and a-half of some inert vehicle, or in a common saline draught, will generally produce quiet; but in cases of any emergency a larger dose, namely, twenty or thirty minims, is usually required; and time is not only often lost, but actual mischief incurred, by the use of an inadequate dose; here, however, as in all instances where powerful remedies are requisite, much must be left to the judgment of the prescriber, and to his acquaintance with the peculiarities of his patient. The varying strength of the tincture, and, indeed, of opium itself, must also not be lost sight of, for they are considerable obstacles to certainty. Some, therefore, have proposed to substitute, in all cases, one of the salts of morphia for crude opium; and of these the *hydrochlorate*, as being most uniform and definite, is the best, perhaps even the only requisite combination or form; yet, that there is something peculiar in opium itself, is perhaps proved by the circumstance that the dose of hydrochlorate of morphia frequently requires to be carried to the same extent as that of opium, in order to produce a corresponding effect; and in all cases, half a grain of hydrochlorate of morphia must be resorted to as the equivalent of a grain of opium, although, calculating upon the produce of morphia, and of the hydrochlorate, from the best opium, it might be presumed that one grain of the salt would be equivalent to about ten of opium. A solution of hydrochlorate of morphia, in the proportion of eight grains of the salt to one ounce of proof spirit, is, however, a good substitute for tincture of opium; each drachm containing one grain of the hydrochlorate. Dr. Thomson says (*Lond. Disp.*), that "the dose of hydrochlorate of morphia is from a quarter of a grain to half a grain, in any bland fluid." The usual dose of the tincture of opium of the Pharmacopœia is, he says, "from ten to sixty minims, but, in some morbid states of the habit, very large doses can be borne, and are even necessary. In colica pictonum, one fluidrachm, given before using purges, facilitates their action, and renders the relief more speedy."

In *tetanus*, it is stated upon the authority of Dr. Currie (*Report on Cold Water*, I. 138), that five fluid ounces and a half of tincture of opium have been given in individual doses, with advantage, in twenty-six hours.

Where the continuous use of opium is required, the necessity of increasing the dose soon becomes apparent; that quantity which at first quiets the system and procures rest, gradually loses its powers, and acts as an excitant rather than a sedative; and persons who have thus become habituated to it, are often obliged to have recourse to appalling doses. As far as possible, therefore, the medical practitioner should endeavour so to manage the administration of the remedy as to prevent its *habitual* use; for it is then with opium as with dram-drinking, and extreme restlessness of body and mental misery are felt when it is suddenly discontinued. "Some years ago I was consulted," says Dr. Thomson, "by a lady, who took a wine pint and a-half of laudanum every week, and who, as she began to experience its bad effects on her constitution, was anxious to discontinue it, but was uncertain how to proceed. I recommended her to get a three-pint bottle of the drug, and to continue her usual dose, but, after taking each portion out of the bottle, always to replace it with water, so that, in progress of time, the bottle would contain water only, and her propensity would be cured." The result of this experiment is not related, but I have known a similar plan successfully adopted, where, however, the quantity of laudanum taken did not exceed two drachms a day, and where brandy was used to fill up the bottle; so that the patient, instead of taking two drachms of laudanum, ultimately arrived at taking two drachms of brandy every evening, and, as the change was very gradual, no inconvenience ensued. Independent of the mental disquiet and nervous irritability which persons habituated to laudanum suffer from its abrupt discontinuance, other, and even more serious inconveniences ensue, and among them none more frequent than diarrhœa. This is not, however, always the case; and instances may be found of persons who, from some accidental cause, have been obliged suddenly to leave off the daily use of opium, and have suffered but little from its omission. Sometimes other narcotics may be substituted for it, more especially henbane; lactucarium, and the extract of white poppies, are also useful remedies on such occasions; and when the necessity of opium is once broken through, these admit of easier reduction and discontinuance.

The extent to which opium is occasionally indulged in by *opium-eaters*, is almost incredible. Some years ago a work was published under the title of *Confessions of an English Opium-Eater*, by a gentleman who wrote from personal experience, and which contains much curious and authentic information upon this part of our subject; it appears that at one time he took about nine ounces of laudanum (8000 drops) daily. According to Dr. Russell (*History of Aleppo*), the effects of opium as frequently witnessed in Turkey, when thus habitually indulged in, are invariably deleterious, producing, in the first instance, obstinate costiveness, succeeded by diarrhœa and flatulence, with loss of appetite, and a sottish appearance; the memory soon fails; the individuals become prematurely old, and then sink into the grave, objects of scorn and pity.

In the *Phil. Trans.* (xix. 289), an account is given by Dr. Edward Smith, of Mustapha Shatoor, a Smyrna opium-eater, who took three drachms of solid opium daily; the visible effects at the time were sparkling of his eyes, and great exhilaration of spirits; he found the desire of increasing his dose growing upon him; he seemed twenty years older than he really was; his complexion was very sallow, his legs small, his gums eaten away, and the teeth laid bare to the sockets. From these and similar statements, it has been a prevalent opinion that the habitual use of opium is always dangerous and deleterious, and frequently, if not always, of fatal termination. But these conclusions must not be too hastily admitted, for many cases might be cited of an opposite character, and, more lately, some important remarks in reference to them have been published by Dr. Christison, whose attention was directed to the subject by the refusal of an Assurance Company to pay a sum of money, on the ground that the insurer (the late Earl of Mar) had been addicted to the vice of opium-eating, which was not made known to the company; he died of jaundice and dropsy; but it was assumed that his life had been shortened by the use of opium. Dr. Christison states, that in consequence of inquiries made on this occasion, he became for the first time aware of the frequency of opium-eating, both among the lower orders and the better ranks of society, and satisfied that the habit is often concealed, that the effects are not those which either professional or unprofessional persons would expect, and that practitioners and toxicologists possess little or no precise information on the matter. His inquiries apparently lead to the conclusion that the practice of eating opium is not so injurious, and an opium-eater's life not so uninsurable, as is commonly thought; and that an insured person who did not make known this habit, could scarcely be considered guilty of concealment to the effect of voiding his insurance; he, however, cautions us against the too hasty deduction of such inferences, which, being drawn from a comparatively small number of cases, are liable to the fallacy often remarked in medical experience arising from the accidental grouping of similar facts. "Meanwhile, however," he observes, "insurance companies and insurance physicians ought to be aware that many persons in the better ranks of life are confirmed opium-eaters, without even their intimate friends knowing it. And the reason is, that at the time the opium-eater is visible to his friends, namely, during the period of excitement, there is frequently nothing in his behaviour or appearance to excite particular attention. From the information I have received, it appears that the British opium-eater is by no means generally subject to the extraordinary excitement of mind and body described by travellers as the effect of opium-eating in Turkey and Persia; but that the common effect is merely to remove torpor and sluggishness, and make him, in the eyes of his friends, an active and conversible man. The prevailing notions of the nature of the excitement from eating opium are, therefore, very much exaggerated. Another singular circumstance I have ascertained is, that constipation is by no means a general effect of the continued use of opium. In some of the cases mentioned above, no laxatives have been required, and in others a gentle laxative once a week is sufficient."

The cases which Dr. Christison alludes to as throwing a doubt over the generally-received opinion as to the eminently injurious effects of the habitual use of opium, are the following:—1. A lady about thirty, in good health, has taken it largely for twenty years, having been gradually habituated to it from childhood by the villany of her maid, who gave it frequently to keep her quiet. 2. A female who died of consumption at the age of forty-two, had taken about a drachm of solid opium for ten years, but had given up the practice for three years before her death; she had led in other respects a licentious life. 3. A well-known literary character, about fifty years of age, has taken laudanum for twenty-five years with occasional short intermissions, and sometimes an enormous quantity, but enjoys tolerable bodily health. 4. A lady, after being in the practice of drinking laudanum for at least twenty years, died at the age of fifty; of what disease, I have been unable to learn. 5. A lady about fifty-five, who enjoys good health, has taken opium many years, and at present uses three ounces of laudanum daily. 6. A lady about sixty gave it up after using it constantly for twenty years, during which she enjoyed good health; and subsequently she resumed it. 7. Lord Mar, after using laudanum for thirty years, at times to the amount of two or three ounces daily, died at the age of fifty-seven, of jaundice and dropsy, but he was a martyr to rheumatism, and, besides, lived rather freely. 8. A woman, who had been in the practice of taking about two ounces of laudanum daily, for very many years, died at the age of sixty or upwards. 9. An eminent literary character, who died lately, about the age of sixty-three, was in the practice of drinking laudanum to excess, from the age of fifteen; his daily allowance was sometimes a quart of a mixture consisting of three parts of laudanum and one of alcohol. 10. A lady, now alive, at the age of seventy-four, has taken laudanum in the quantity of half an ounce daily, between thirty and forty years. 11. An old woman died not long ago, at Leith, at the age of eighty, who had taken about half an ounce of laudanum, daily, for nearly forty years, and enjoyed tolerable health all the time. 12. Visragee, a celebrated Cutchee chief, had taken opium largely all his life, and was alive when Dr. Burnes drew up his narrative, at the age of eighty, paralysed by years, but his mind unimpaired. (*See* CHRISTISON, *On Poisons*, chap. XXXII.)

I might, from the records of medical practitioners, cite several analogous cases of persons who have gradually inured themselves to large doses of opium, and upon whom it does certainly not appear to have produced those decidedly deleterious effects which are sometimes represented as its inevitable consequences; but I believe that such cases are far from common. Not so, however, with persons who habitually take laudanum to a much smaller extent, and with whom it serves as a substitute for wine, tea, or coffee; relieving lassitude and disposition to drowsiness and mental inactivity. In these instances, it becomes a question whether it is more prejudicial than the above-named ordinary stimulants; whether it may not be sometimes judiciously substituted for them; and whether, on the other hand, those who have habituated themselves to these small exciting doses of opium, may not frequently resort with advantage to strong tea and coffee as substitutes. That small doses of opium are, in the end, less prejudicial than large ones of wine, will, I think, appear evident to those who will take the trouble of tracing their parallel effects.

The considerations suggested in the preceding paragraphs have important bearing upon the medicinal applications of opium; for where it has been habitually used, its effects upon the system are of course proportionately modified; and when it has been so used, and then discontinued, it must, if again resumed, be circumspectly employed, and in much smaller doses than those in which it was taken with impunity at the time of its discontinuance; this, though self-evident to the medical practitioner, is not always so to the patient.

The *formulæ* for the administration of opium admit of many modifications, and, as elsewhere observed, its effects as a therapeutic agent are often much influenced by its vehicles and adjuncts. Camphor mixture, or the common saline draught, or occasionally some aromatic water, in the bulk of ten drachms, or an ounce and a half, may in most cases be used as vehicles for the tincture; and when the taste of crude opium is objected to, the *Vinum Opii*, which is made with purified opium, may be employed. Acids are generally supposed to be more perfect solvents of the active parts of opium than proof spirit, and there is certainly no inconsiderable proportion of morphia left in the residue of the officinal tincture. The addition of alkalis and of magnesia to tincture of opium, precipitate the morphia, and consequently mitigate its activity; and tannin and gallic acid, from the difficult solubility of their compounds with morphia, probably produce the same effect. Tinctures of opium, originally made with alkaline menstrua, and afterwards filtered, are obviously eminently unchemical; the *Tinctura Opii Ammoniata* of the *Edinburgh Pharmacopœia*, is open to this objection. An acid tincture of opium might perhaps with propriety have been introduced into the Pharmacopœiæ. Dr. Paris states that a citric solution of opium is often a valuable substitute for, and acts with less disturbance than the usual tincture, and recommends Dr. Porter's *Liquor Morphii Citratis*, which is prepared by triturating four ounces of powdered opium and two ounces of crystallised citric acid with a pint of boiling distilled water; the mixture is then macerated for twenty-four hours, and filtered.

When circumstances render the internal exhibition of opium inconvenient, or when it is rejected by the stomach, benefit is sometimes derived by its external application; in this way, liniments of opium may be rubbed along the spine, or applied to the stomach and abdomen, or rubbed upon the jaw in symptomatic trismus. In the form of suppository, or as an enema, opium relieves painful affections of the rectum, bladder, and adjacent parts. "A weak, watery solution of opium is a useful adjunct to injections in gonorrhœa, and to collyria in ophthalmia, and the vinous tincture dropped into the eye removes ecchymosis and the suffusion which often remains in that disease, after the inflammation has been subdued, and restores the tone of the diseased organ. The aqueous solùtion also lessens the pain of open cancer, when cloths soaked in it are laid over the sore, and it is as useful in lacerated wounds of tendinous and aponeurotic parts." (*Thomson.*)

Toxicological History of Opium.—There is no poison of such frequent occurrence as opium; it is a common instrument in the hands of the suicide; it has been used to commit murder and to induce insensibility previous to the commission of robbery; and fatal accidents are often ensuing from its careless administration and extensive employment in medicine. The mode of action of opium, and the symptoms which it induces, have already been referred to. Whether it acts through the medium of the blood upon the brain; whether its influence is conveyed along the nerves; or whether it produces an impression on the inner coat of the blood-vessels which is conveyed more exclusively along their nerves, are questions not hitherto satisfactorily answered; those, however, who will take the pains of examining the conflicting evidence respecting its *modus operandi*, will probably deem transmission by the blood the most probable cause of its influence upon the sensorium.

The symptoms produced by an excessive dose of opium are principally marked by giddiness and stupor; the respiration is slow, the eyes closed, the pupils contracted, and an expression of deep repose rests upon the countenance. Afterwards the muscles become relaxed, the features ghastly, the pulse extremely feeble, and death soon supervenes. If the patient recovers, the sopor is followed by heavy sleep, which lasts from twenty-four to thirty-six hours, and is succeeded by sickness and giddiness. Here, as in other cases of poisoning, it is often of much importance to ascertain the period which elapses between the taking of the poison and the commencement of the symptoms. This will vary from various causes, but much will depend upon the form in which the opium has been administered.

In cases mentioned by Dr. Christison, large doses of *laudanum* induce symptoms in ten or fifteen minutes; but if taken in the solid form, it does not begin to act in less than half an hour. "It is singular," he observes, "that an interval of an hour was remarked in a case where the largest quantity was taken which has yet been recorded. The patient swallowed eight ounces of crude opium, but in an hour her physician found her able to tell connectedly all she had done, and she recovered. In some rare cases the sopor is put off for a longer period."

The peculiar sopor produced by opium is very characteristic of the poison; it differs from coma in the patient continuing capable of being roused by shaking, tickling, or splashing with cold water. Dr. Christison observes, that the possibility of rousing the patient from the lethargy caused by opium is often a good criterion for distinguishing the effects of this poison from apoplexy and epilepsy. It is curious that, although opium always produces convulsions in other animals, it rarely does so in man; they are, however, not an uncommon consequence of the administration of opium to children. Delirium is also a rare symptom of poisoning by opium.

The quantity of opium requisite to produce fatal effects will depend upon a variety of causes. The smallest quantity which, upon good evidence, has occasioned death, is four grains and a half; it was taken with nine grains of camphor, and was followed by the usual symptoms of narcotism and death in nine hours. The man took the opium for a cough at seven in the morning; at nine his wife found him in a deep sleep, from which she could not rouse him; nothing was done for his relief till three in the afternoon, when he was labouring under all the usual symptoms of poisoning with opium; death ensued in an hour, notwithstanding the active employment of remedies.

Young children are so sensible to the poisonous influence of opium, that even the smallest dose cannot be given to them with impunity. Cases are recorded of infants several months old killed by three or four drops of laudanum; and Dr. Christison cites an instance of a healthy infant, four weeks old, killed by an anodyne draught, containing an eighth of a grain of opium, and as much henbane.

The action of poisonous doses of morphia resembles that of opium, but it is more powerful.

The common duration of fatal cases of poisoning from opium is stated by Christison as from seven to twelve hours; those who outlive twelve hours, generally recover. Fatal cases of longer duration are, however, on record.

It has been stated, upon the authority of Orfila and others, that opium acts more powerfully when introduced into the rectum, than into the stomach; this, however, is certainly not the case, and it is frequently administered in clysters in doses which would have proved fatal if swallowed. Opium should be applied externally, in lotions and liniments, with some caution, especially to children, and in certain diseased states of the integuments. A case is also on record, in which death is said to have been produced by the introduction of solid opium into the external ear, for the cure of ear-ache.

The principal morbid appearances which have been met with on dissection, in cases of opium poisoning, are turgescence of the vessels of the brain, and effusion of water upon its surface and into the ventricles. Extravasation of blood is rare, except, perhaps, where a predisposition to apoplexy has existed. The lungs, too, are sometimes found gorged with blood. Any extraordinary appearance in the stomach is of rare occurrence. The blood is generally fluid, and the body often tends to rapid decomposition. The detection of opium in the stomach depends upon several accidental circumstances; sometimes it appears to have been digested, and sometimes removed by absorption; sometimes it may be detected by its odour, by tests, and by the poisonous influence of the contents of the stomach upon dogs and other animals. Neither opium nor the salts of morphia appear to undergo destructive decomposition by long contact with putrefying animal matter, for it has been detected under such circumstances, by tests, after the lapse of many months.

The following general process for the detection of opium in mixed fluids and solids, has been suggested by Dr. Christison:—1. If there is any solid matter, it is to be cut into small fragments; water is to be added if necessary, then a little acetic acid to render the mixture slightly acidulous, and when the whole mass has been well stirred, and has stood a few minutes, it is to be filtered and evaporated at a temperature somewhat below ebullition, to the consistence of a moderately thick syrup. To this extract, strong alcohol is to be gradually added, care being taken to break down any coagulum which may be formed; and, after ebullition and cooling, the alcoholic solution is to be filtered. The solution must then be evaporated to the consistence of thin syrup, and the residue dissolved in distilled water, and filtered anew.

2. Add now solution of acetate of lead as long as it causes precipitation; filter, and wash. The filtered fluid contains the morphia, and the precipitate on the filter contains the meconic acid, combined with oxide of lead.

3. The fluid part is to be treated with sulphuretted hydrogen, to throw down any lead which may remain in solution. It is then to be filtered while cold, and evaporated sufficiently in a vapour-bath. The solution in this state will sometimes be sufficiently pure for the application of the tests for morphia; but in many cases it is necessary, and in all advisable, to purify it still further. For this purpose, the fluid is to be precipitated with ammonia, and the precipitate having been collected, washed, and drained on a filter, the precipitate and a portion of the filter to which it adheres, are to be boiled in a little pure alcohol. The alcoholic solution, filtered, if necessary, will give, by evaporation, a crystalline residue, which becomes orange-red with nitric acid, and blue with permuriate of iron. The latter property cannot always be satisfactorily developed.

4. It is useful, however, to separate the meconic acid also, because, as its properties are more delicate, it may be more satisfactorily detected than morphia; for this purpose, diffuse the precipitate by acetate of lead (par. 2), in a little water, transmit sulphuretted hydrogen, till the whole precipitate is blackened; filter immediately without boiling; then boil, and, if necessary, filter a second time. A great part of the impurities thrown down by acetate of lead will be separated with the sulphuret of lead, and the meconic acid is dissolved. But it requires, in general, further purification, which is best attained by again throwing it down with acetate of lead, and repeating the steps of the present paragraph. The fluid is now to be concentrated by evaporation, and subjected to the tests for meconic acid; more particularly to the action of perchloride of

iron, when the quantity is small. If there is evidently a considerable quantity of acid, a portion should be evaporated till it yields crystalline scales, which have always a yellowish tint; these, when heated in a tube, yield an arborescent crystalline sublimate. (*See* CHRISTISON, *On Poisons*, chap. XXXII.)

It may be observed, in regard to what are termed the tests for opium, that they are, in fact, tests of morphia and of meconic acid. When morphia is present in such proportion that it can be obtained in crystals from its alcoholic solution, and leisurely and accurately examined, there is no difficulty in identifying it; but the tests which are most relied upon for its detection in very minute quantities, namely, nitric acid and permuriate of iron, are, when so applied, equivocal and unsatisfactory. The reddening by nitric acid, or rather the orange-colour so produced, is destroyed by a little excess of acid, and is, moreover, not altogether peculiar to morphia, so that, when working upon a small fraction of a grain of suspected matter, the operator may be easily deceived. The reddening of the persalts of iron by meconic acid is certainly more definite; but then, sulphocyanic acid, and some other organic acids, produce a similar effect; and although, if we find meconic acid, we may, in these cases, fairly infer the presence of morphia or of opium, yet meconic acid is itself not poisonous. So that, in the absence of other proof, it must be allowed that, upon a subject of such importance as medico-legal evidence in a court of justice, it would be necessary to use extreme caution in regard to any opinion deduced from the usual tests.

OPOPONAX (οπος, *juice*, and πανακης, *all healing*). *Gummi-resina.* The gum-resin of the *Opoponax chironium.* *Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

This plant is a native of the south of Europe, and flowers in June and July. It has a perennial, thick, fleshy tapering root; the stalk is strong, branched, rough at bottom, and seven or eight feet high: the leaves are pinnated, consisting of several pairs of pinnæ, which are oblong, serrated, and veined: the flowers are yellow, small, and terminate the stem and branches in flat umbels: the general and partial umbels are composed of many radii: the involucra are commonly wanting; all the florets are fertile and uniform: the petals are five, lanceolate, and curled inwards: the filaments are spreading, curved, longer than the petals, and furnished with roundish anthers: the germen is below the corolla, and supports two reflexed styles with blunt stigmata: the fruit is elliptical, compressed, divided into two parts, containing two flat seeds.

The root of this plant furnishes a milky juice, which, dried in the sun, is the *opoponax* of the shops. It occurs in tears, and in irregular yellowish brown masses, having somewhat of the odour of galbanum, and a bitterish taste. It is imported from Turkey and India. In pharmacy opoponax ranks with ammoniacum and galbanum, but it has of late fallen into disuse, and might have been excluded from the Materia Medica.

According to Pelletier, 100 parts of opoponax yield—

Volatile oil and loss	5·9
Resin	42·0
Wax	0·5
Gum	33·4
Extractive, and malic acid	4·2
Starch	4·2
Woody fibre and impurities	9·8
	100

ORIGANUM (*ὄρος*, *a hill*, and *γανόω*, *I delight*). Wild Marjoram. *Origanum vulgare*. *Cl.* 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. Ord.* Labiatæ or Lamiaceæ.

This plant thrives in chalky and gravelly soils, and blows in July: it has a perennial, creeping, fibrous root: the stem is erect, square, purplish, downy, producing opposite branches, and about eighteen inches high: the leaves stand upon footstalks in pairs at the joints, and are ovate, pointed, smooth above, and downy beneath, and of a deep yellow-green colour. The flowers are numerous, terminal, pale purple, and stand in clusters; the floral leaves are oval, sessile, and of a brownish colour: the calyx is tubular, and divided at the brim into five segments, fringed at the edges: the corolla is a funnel-shaped tube, longer than the calyx, divided at the limb into two lips, of which the upper is erect, bifid, and obtuse, and the under trifid, blunt, and spreading: the filaments have double anthers; the germen is divided into four parts, from the centre of which rises a filiform style, crowned with a bifid, reflexed stigma. The seeds are four, oval, and lodged in the bottom of the calyx.

Wild marjoram is a warm and pungent aromatic herb. Its infusion was formerly used as a tonic and emmenagogue. It yields, on distillation with water, an acrid, pungent oil, of an agreeable odour, the use of which is confined to external applications; it is prescribed in stimulating liniments and for the relief of toothache. The average produce of essential oil from this herb is one pound from two hundred-weight; but it varies exceedingly with the season and culture of the plant. It is often sold under the name of *oil of thyme*.

Sweet Marjoram (*Origanum Marjorana*) is a native of Portugal and Syria, and cultivated in our gardens chiefly for culinary, and sometimes for medical use.

ORNUS EUROPÆA, *see* MANNA.

OVUM. The Egg of the common fowl, *Phasianus gallus*.

Eggs are well known as nutritious food; the yolk, beaten up with a little wine, or brandy and sugar, is a good restorative in cases of debility, and forms an ingredient in the *Mistura Spiritus Vini Gallici* (page 186). The yolk of egg is often used as a medium for mixing or suspending insoluble or imperfectly soluble substances in water: it contains about 30 per cent. of oil, which may be obtained by expression from hard-boiled yolks which have been slightly torrefied. It had a place in old Pharmacopœiæ, under the name of *Oleum Ovorum*, and was celebrated as a remedy for deafness, a few drops being put into the ear night and morning; and it may have been useful as an unctuous application in cases of deficient ceruminous secretion. The remainder of the yolk is chiefly albumen: it also contains phosphorus.

The white of egg derives its characters from the presence of *albumen:* when heated to about 150° it coagulates. Albumen is also coagulated by alcohol and by several acids. The most delicate test of albumen in animal fluids is a solution of corrosive sublimate, which occasions a white cloud in extremely dilute albuminous liquids; another very sensible test of its presence is the ferrocyanuret of potassium, a few drops of distilled vinegar having been previously added.

Egg-shells are chiefly carbonate of lime; they contain about 1 per cent. of phosphate of lime and magnesia, and 2 per cent. of animal matter.

OXALIS ACETOSELLA, *see* ACETOSELLA.

PAPAVER. *Capsulæ maturæ.* The ripe seed capsules of the *Papaver somniferum.*

As opium is obtained by wounding the capsules or poppy-heads, it follows that the entire capsule will contain the same principles as opium; opium is, however, the concrete juice of the *unripe capsules* grown generally in warm climates: poppy-heads, when collected for medical use, are *ripe*, and are grown in this country. Owing chiefly to the uncertainty of our climate, the growth of the poppy for the purpose of collecting opium is seldom attempted: very excellent opium has, however, been produced in Britain (see *Trans. of the Society of Arts*, vol. XIV. *Quart. Journ. of Science*, vol. IV. *Edin. Philos. Journ.* vol. I.)

The ripe poppy-heads, when dried, and freed from the included seeds, which are oleaginous and not at all narcotic, furnish two valuable medicinal preparations, a syrup and extract; there is also a formula in the Pharmacopœia for a decoction.

EXTRACTUM PAPAVERIS.	EXTRACT OF POPPY.
℞ Papaveris contusi, demptis seminibus, uncias quindecim,	Take of Poppy (capsules, dried, bruised, and) free from seed, fifteen ounces,
Aquæ destillatæ ferventis, congium;	Boiling distilled Water, a gallon;
Macera per horas viginti quatuor; tum decoque ad octarios quatuor, et liquorem adhuc calentem cola; denique ad idoneam crassitudinem consume.	Macerate for twenty-four hours, then boil down to four pints and strain the liquor whilst it is yet hot; lastly, evaporate to a proper consistence.

SYRUPUS PAPAVERIS.	SYRUP OF POPPY.
℞ Papaveris, libras tres,	Take of Poppy (capsules, dried, bruised, and deprived of seed), three pounds,
Sacchari, libras quinque,	Sugar, five pounds,
Aquæ ferventis, congios quinque;	Boiling Water, five gallons;

Capsulas in aquâ ad congios duos decoque, et fortitèr exprime. Liquorem colatum iterum decoque ad octarios quatuor, et adhuc ferventem cola. Sepone per horas duodecim, ut fæces subsidant; tum liquorem defæcatum decoque ad octarios duos; saccharum adjice et liqua.	Boil the capsules in the water down to two gallons, and strongly press them. Boil down the strained liquor again to four pints, and strain while hot. Set aside for twelve hours that the dregs may subside; then boil down the clear liquor to two pints; add the sugar and dissolve it.

Decoctum Papaveris.	Decoction of Poppy.
℞ Papaveris concisi, uncias quatuor,	Take of Poppy (capsules), sliced, four ounces,
Aquæ, octarios quatuor;	Water, four pints;
Coque per quartam horæ partem, et cola.	Boil for a quarter of an hour, and strain.

Extract of poppy, when carefully prepared, is an excellent substitute for opium, and may often be used where the latter occasions nausea and headache. From two to three, up to eight or ten grains, is the usual dose for an adult; its effect gradually decreases by habit, and twenty or thirty grains are occasionally taken by those who have accustomed themselves to its influence. From various causes, its activity is, however, uncertain; it should, therefore, be prescribed with requisite caution. It is generally used in the form of pill, but it may be also dissolved in any proper vehicle; its soothing qualities are generally unattended by any previous excitement, and it is less liable to constipate the bowels than opium. Small lozenges, each containing a quarter of a grain of extract of poppy, with a little sugar, starch, and gum tragacanth, and, if necessary, an eighth of a grain of ipecacuanha or of squill, are good sedative expectorants in cases of common cough. This extract may also be combined with extract of henbane or of hemlock. One hundred-weight of dried poppy-capsules, without seeds (which generally amount to nearly half their weight), yield an average produce of thirty-five pounds of extract, which loses about ten per cent. when so far dried as to be brittle enough for powdering.

Syrup of poppies is a very useful and effective opiate, and given at bedtime, in the dose of one or two drachms, induces rest and slight tendency to perspiration. It should not be given to children without the utmost caution, and by no means trusted to nurses, for a teaspoonful has proved fatal to a healthy infant. It should be prepared strictly according to the directions above given, and should be kept in a cool place; when not thick enough, it is very prone to fermentation, especially in warm rooms; it is often carelessly prepared, and sometimes simple syrup with the addition of tincture of opium is substituted for it. It is frequently stated that it may be administered in the dose of half an ounce to an ounce; but in the latter quantity it would be dangerous, even to an adult. Cases are not unfrequent in which a drachm or two of this syrup procures rest where neither opium nor the salts of morphia are effectual; or where they nauseate and induce headache. The addition of from three to four per cent. of sugar of milk to syrup of poppies is stated upon the authority of M. Chereau to obviate its fermentative tendency. It may be conveniently conjoined with small doses of oxymel of squills to allay the violence of cough.

Decoction of poppy is intended as an anodyne fomentation, but it is seldom more effectual than warm water; a solution of the extract of poppy, or a mixture of tincture of opium and hot water, may be more conveniently adopted where such an application is required. Dr. Thomson says, "in making this decoction the seeds should not be rejected, as they contain a considerable portion of bland oil, which, added to the mucilage and narcotic principle of the capsules, increases the emollient quality of the decoction. It is a useful fomentation in painful swellings, in excoriations produced by the thin acrid discharge of ulcers, and those common to infants. Its efficacy is promoted by the addition of six ounces of distilled vinegar to the quantity of the decoction ordered."

PAREIRA. *Radix.* The root of the *Cissampelos Pareira. Cl.* 22. *Ord.* 10. Diœcia Dodecandria. *Nat. Ord.* Menispermaceæ.

This plant is a native of the West Indian Islands. It is a twining shrub with smooth stem. Leaves nearly orbicular, peltate, aristate at the point, when full-grown smooth above, and underneath covered with silky pubescence. Peduncles solitary or in pairs, branching from the base, as long as, or longer than, the petiole; racemose-corymbose, with divaricating downy ramifications; flowers hispid. Racemes longer than the leaves, bearing the flowers in spiked fascicles. Bracts sessile, somewhat orbicular, scarcely mucronate. Berries scarlet, round, compressed, shrivelled, hispid with long hairs.

This root, formerly called *Pareira brava*, was long-ago used as a tonic and lithontriptic. It has been reintroduced into our Materia Medica chiefly at the suggestion of Sir Benjamin Brodie. It is imported in pieces of various thickness, and two to three feet long; it is dense, ligneous, and of a yellowish brown colour. Those samples which are of a very loose and fibrous texture and dark colour, are apparently the stems, and are inert compared with the wood of the root; the latter is difficultly obtained, and seldom met with in trade. It has a bitter-sweet taste, and yields its active principles to water and alcohol. The Pharmacopœia directs an *Infusion* and *Extract.*

Infusum Pareiræ.	Infusion of Pareira.
℞ Pareiræ, drachmas sex,	Take of Pareira (root sliced), six drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours in a loosely-covered vessel, and strain.

Extractum Pareiræ.	Extract of Pareira.
℞ Pareiræ concisæ, libras duas cum semisse,	Take of Pareira root, sliced, two pounds and a-half,
Aquæ destillatæ ferventis, congios duos;	Boiling distilled Water, two gallons;
Macera per horas viginti quatuor, tum decoque ad congium, et liquorem adhuc calentem cola; denique ad idoneam crassitudinem consume.	Macerate for twenty-four hours; then boil down to a gallon, and strain the liquor whilst hot; lastly, evaporate to a proper consistence.

The infusion may be used as a vehicle for the powdered root or the extract. From twenty to forty grains of the former, and from five to twenty grains of the latter, may be given for a dose. In chronic inflammation of the bladder, attended by secretion of ropy alkaline mucus, and in those cases of irritability of the kidneys and bladder in which the urine is white and turbid from the deposition of ammonio-magnesian phosphate, pareira often acts as a specific. Sir Benjamin Brodie prescribes it with small doses of henbane; and in phosphatic diathesis, with nitric acid.

PETROLEUM. (*Petroleum Barbadense*). Barbadoes Petroleum. Mineral Tar.

This bituminous substance has been employed internally as a sudorific and diaphoretic, and externally as a stimulating application in cases of chronic rheumatism, porrigo, chilblains, and affections of the joints. In this country it never was in much repute. In Germany it has been extolled as an anthelmintic. The following are Schwartz's drops for the cure of tape-worm:—

℞ Petrolei, ℥ss.
Tinct. Assafœtid. ʒvj.
M. sit dosis gutt. 40 ter de die.

PHOSPHORUS. (φῶς, *light*, and φέρειν, *to bear.*)

This simple substance was discovered in 1669, by Brandt, a merchant of Hamburg; he obtained it by the destructive distillation of the residue of the evaporation of urine. Kunckel, a German chemist, aware of the source whence it was derived, procured it by the same process, and about the year 1680 it was largely prepared under the direction of the celebrated Boyle, by his chemical assistant, Godfrey Hankwitz, the founder of the chemical establishment long known as "Godfrey's," in Southampton Street, Covent Garden. Boyle described the method of preparing it in a tract entitled "*Aerial Noctiluca.*" Margraaf of Berlin, and Giobert of Turin, improved the process; but it is to Gahn and Scheele that we are indebted for the method of obtaining it which, with some practical improvements, is now generally adopted. Scheele discovered the existence of phosphoric acid in *bone-earth*, the residue of the calcination of bone: this substance is reduced to powder and digested for a day or two with half its weight of sulphuric acid diluted with enough water to give the mixture the consistency of a thin paste; it is thus decomposed and resolved into sulphate and superphosphate of lime. The latter is dissolved out by washing the mass, and separated from the residuary sulphate of lime by filtration; the filtered liquor is then evaporated nearly to dryness, mixed with about one-fourth of its weight of powdered charcoal, and strongly heated in a coated earthen retort, the beak of which dips into water, in which the vapour of the evolved phosphorus condenses in the form of a reddish-brown fusible substance. It is purified by fusion in hot water, and pressing it through a piece of chamois leather, and is usually cast into sticks by allowing it to cool under water in a glass tube.

In this process, the charcoal combines with the oxygen of the phosphoric acid, and carries it off in the form of carbonic acid; some undecomposed phosphate of lime and redundant charcoal remain in the retort, and the phosphorus distils over.

Pure phosphorus is transparent, or translucent and nearly colourless, but, as it occurs in trade, it is usually of a pale fawn-colour; it is of a waxy consistence. Its specific gravity is 1·7. It fuses at 108°, and at 550° it is converted into vapour, the specific gravity of which is 4·35. When fused at 150°, and then suddenly cooled, it becomes black; but when again fused and slowly cooled it regains its usual appearance. When very gradually cooled, it occasionally forms octoëdral crystals.

Phosphorus is characterized by its extreme inflammability. It undergoes a slow combustion at common temperatures, and is luminous in the dark, exhaling fumes having an alliaceous odour; when rubbed, or moderately heated, it bursts into a brilliant flame, throwing off copious fumes of phosphoric acid. It is sparingly soluble in absolute alcohol, and more so in ether; it also dissolves in fixed and volatile oils, in sulphuret of carbon, and in several of the liquid hydrocarbons.

The following are the characters of phosphorus given in the *Notes* of the Pharmacopœia.

PHOSPHORUS. Coloris ferè expers, ceræ similis, translucet, lumen in tenebris edit. In plerisque oleis destillatis et in æthere sulphurico parùm liquatur. Hic non nisi in aquâ, intercluso luminis accessu, servari debet.	PHOSPHORUS. It is almost colourless, resembles wax, is translucent, evolves light in the dark. It is sparingly soluble in many distilled oils and in sulphuric ether. It should be kept in water, out of the access of light.

In combination with oxygen, phosphorus forms an oxide and three acids, which have been termed *hypophosphorous*, *phosphorous*, and *phosphoric acids:* the latter only is used medicinally.

Phosphoric acid is obtained by the full oxidizement of phosphorus, which may be effected by its combustion at high temperatures, or by the action of nitric acid. It is also sometimes procured from the superphosphate of lime, resulting from the decomposition of bone-earth in the above-mentioned process: its excess of acid is saturated by ammonia, the liquor is filtered to separate the precipitated phosphate of lime, and the solution of phosphate of ammonia so obtained is evaporated and crystallised; the salt is then heated and fused, by which the ammonia is expelled, and the phosphoric acid remains. In this state it is transparent, deliquescent, intensely sour, and retains water after fusion at a red heat. When anhydrous it consists of—

	Atoms.	Equivalents.	Per Cent.
Phosphorus	1	16	44·44
Oxygen	2½	20	55·56
Phosphoric Acid	1	36	100·00

The Pharmacopœia directs the preparation of *diluted phosphoric acid* as follows:—

ACIDUM PHOSPHORICUM DILUTUM.

℞ Phosphori, unciam,
Acidi Nitrici, fluiduncias quatuor,
Aquæ destillatæ, fluiduncias decem;

Acido nitrico aquâ mixto, et in retortâ vitreâ in balneum arenæ imposito, phosphorum adjice; tum calorem adhibe, donec fluidunciæ octo prodierint. Hæ in retortam iterùm mittantur ut fluidunciæ octo destillent, quæ rejiciendæ sunt. Liquorem superstitem in capsulâ è platino fictâ, consume donec unciæ duæ cum drachmis sex de toto restent. Denique acido, ubi refrixerit, adjice aquæ destillatæ quantum satìs sit, ut fluidunciarum viginti octo mensuram accuratè impleat.

NOTA.

ACIDUM PHOSPHORICUM DILUTUM. Addito vel barii chlorido, vel argenti nitrate, quicquid demissum fuerit, idem ab acido nitrico facilè liquatur. Cupri et argenti laminas nullo modo afficit, neque acido hydrosulphurico immisso coloratur. Pondus specificum est 1·064. Sodæ carbonatis gr. 42, ab hujus acidi gr. 100 saturantur, et nihil indè demittitur.

DILUTED PHOSPHORIC ACID.

Take of Phosphorus, an ounce,
Nitric Acid, four fluid ounces,
Distilled Water, ten fluid ounces;

Add the phosphorus to the nitric acid, mixed with the water, in a glass retort placed in a sand bath; then apply heat till eight fluid ounces have passed over. Return these into the retort, that eight fluid ounces may again distil, which are to be rejected. Evaporate the remaining liquor in a capsule made of platinum, till only two ounces and six drachms remain. Lastly, add to the acid, when it has cooled, as much distilled water as may be sufficient to make it accurately measure twenty-eight fluid ounces.

NOTE.

DILUTED PHOSPHORIC ACID. That which is thrown down from it either by chloride of barium or by nitrate of silver, is readily soluble in nitric acid. Strips of copper and silver are not in the least affected by it, nor is it coloured by the addition of hydrosulphuric acid. Its specific gravity is 1·064. Forty-two grains of carbonate of soda are saturated by 100 grains of this acid, and nothing is thrown down.

Remarks (PHILLIPS). "The absence of sulphuric acid and of a sulphate is proved by there being no precipitate yielded by chloride of barium, which is insoluble in nitric acid; that no hydrochloric acid, nor any chloride, is held in solution, is proved by nitrate of silver giving no precipitate which is insoluble in nitric acid. The quantity of carbonate of soda neutralised by 100 grains of this acid shows that it contains 10·5 per cent. of real phosphoric acid; and when the carbonate of soda gives no precipitate, no phosphate of lime nor other phosphate insoluble in water is dissolved by the phosphoric acid."

Medical Uses of Phosphorus and Phosphoric Acid.—Phosphorus has not been much used in this country, but on the Continent it has been more extensively employed as a powerful diffusible stimulant, and has been occasionally prescribed in a great variety of disorders; namely, as a nervous stimulant in low fevers and Asiatic cholera, in convulsions and epilepsy, and in intermittent headache; and, above all, as a generative stimulant in certain cases of impotency. It accelerates the pulse, and promotes perspiration, and the secretion of urine, which is said to have become phosphorescent during its use. It is usually given either in ethereal or in oily solution. The *Ether Phosphoratus* of the Parisian *Codex* is prepared by dissolving three grains of phosphorus in a fluid ounce of sulphuric ether, of which, ten drops have been given every three or four hours in any bland or mucilaginous vehicle. Some prefer the oily solution prepared by digesting a drachm of phosphorus, cut into small pieces, in an ounce and a half of olive oil; after allowing the mixture to remain in a dark place for fifteen days, the solution is poured off, and may be flavoured with a few drops of oil of lemons. Of this *phosphorated oil*, from ten to thirty drops may be given two or three times a day.

But phosphorus must not be carelessly administered, for in small doses it acts as an irritant poison, producing inflammation and erosion of the stomach and bowels. Doses of three or four grains, or less, have proved fatal to dogs; and even water in which phosphorus has been kept, has poisoned poultry. Its effects on man, though seldom witnessed, appear equally dangerous. A case is quoted by Dr. Christison, on the authority of M. Worbe, the subject of which was a stout young man, who took a grain and a half (in hot water?) after having previously swallowed half a grain without injury. In seven hours he was attacked with pain in the stomach and bowels, then with incessant vomiting and diarrhœa, tenderness and tension of the belly, and other symptoms of irritant poisoning, and he died exhausted in twelve days. Another fatal case, related by M. Fontenelle, is quoted from the *Revue Medicale* (1829, III., 429). An apothecary, after taking in one day first a single grain and then two grains of phosphorus, without experiencing any particular effects, swallowed next day three grains at once, in syrup. In the evening he felt generally uneasy, from a sense of pressure in the abdomen, which continued for three days, and he was then seized with violent vomiting of a matter having an alliaceous odour. On the seventh day he had delirium, spasms, and palsy of the left hand, and died shortly after. A third case is mentioned on the authority of Dr. Flachsland, of Carlsruhe. The phosphorus was taken on bread and butter, by the advice of a quack, for the cure of impotency; the patient was a young man; the symptoms were violent pain of stomach and bowels, together with the discharge, by clysters, of small particles of phosphorus, and continual vomiting: he died in forty hours. On examination after death, the omentum and outside of the intestines were red, and fluid blood was discharged from the first incisions through the skin of the abdomen; the villous coat of the stomach, and the inner membrane of the duodenum, presented an appearance of gangrenous inflammation (probably black extravasation only); the great intestines were contracted to the size of the little finger, the mesenteric glands enlarged, and the spleen and kidneys inflamed.

In the therapeutic employment of phosphorus, the curious statement of Couerbe respecting its existence in the brain, should not be overlooked. It is said to be present in that organ to the amount of from two to two and a-half per cent. in persons of sound intellect; but he asserts that it is in comparative deficiency in the brain of idiots, and redundant in that of violent maniacs, amounting, in the former, to not more than from one to one and a-half per cent., and in the latter to three, four, and four and a-half per cent.

Phosphoric acid, like other acids, is refrigerant and tonic, but it has been especially used in those cases of urinary deposits in which the phosphates prevail, and in that state of the system which is frequently distinguished as the phosphatic diathesis; it has also been presumed, rather than proved, to be more useful than other acids in cases of exostosis, and other bony tumours. From ten to twenty drops of the diluted acid of the Pharmacopœia may be given three or four times a day in any proper vehicle.

PILULÆ. (dim. of *pila*, a ball.) Remedies which are active in small doses, insoluble or difficultly soluble in water, or nauseous to the palate, are conveniently administered in the form of *pills*. They are generally strewed over with starch, magnesia, liquorice-powder, or lycopodium, to prevent their adhesion; and these powders, or the external application of gold or silver leaf, render them less apt to be tasted in the act of their deglutition.

With one or two exceptions, pill-masses should be excluded from the formulæ of a Pharmacopœia, and left to extemporaneous prescription; or their ingredients should be kept in powder, and formed into pills when required for use.

When long kept, most pills become hard, and proportionately difficult of solubility in the stomach; so that active remedies may thus lose their efficacy, or become so indurated as in many cases to be voided with little alteration, after having passed the stomach and bowels. Soap, soluble saline substances, and sugar, are good additions to obviate such source of inactivity. They should not exceed four or five grains in weight, and it is more agreeable to most persons to swallow two small, than one large pill. The following are the Pills of the present Pharmacopœia:—

Pilulæ Aloes Compositæ .	Pills of Aloes (compound) *see* Aloe.
Pilulæ Aloes cum Myrrha .	Pills of Aloes with Myrrh, *see* Aloe.
Pilulæ Cambogiæ Compositæ .	Pills of Gamboge (compound), *see* Cambogia.
Pilulæ Conii Compositæ . .	Pills of Hemlock (compound), *see* Conium.
Pilulæ Ferri Compositæ . .	Pills of Iron (compound), *see* Ferrum.
Pilulæ Galbani Compositæ .	Pills of Galbanum (compound), *see* Galbanum.
Pilulæ Hydrargyri . .	Pills of Mercury, *see* Hydrargyrum.
Pilulæ Hydrargyri Chloridi Compositæ . . .	Pills of Chloride of Mercury (compound), *see* Hydrargyrum.
Pilulæ Hydrargyri Iodidi .	Pills of Iodide of Mercury, *see* Hydrargyrum.
Pilulæ Ipecacuanhæ Compositæ,	Pills of Ipecacuanha (compound), *see* Ipecacuanha.
Pilulæ Rhei Compositæ . .	Pills of Rhubarb (compound), *see* Rheum.
Pilulæ Sagapeni Compositæ .	Pills of Sagapenum (compound), *see* Sagapenum.
Pilulæ Saponis Compositæ .	Pills of Soap (compound), *see* Sapo.
Pilulæ Scillæ Compositæ .	Pills of Squill (compound), *see* Scilla.
Pilulæ Styracis Compositæ .	Pills of Styrax (compound) *see* Styrax.

PIMENTA. *Baccæ immaturæ exsiccatæ.* The unripe dried berries of the *Eugenia Pimenta*. *Cl.* 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Myrtaceæ.

This tree is common in the West Indies, especially in Jamaica. It has a smooth gray bark; the leaves are three or four inches long, veined, pointed, elliptical, and deep green; the flowers are in panicles upon trichotomous stalks; the calyx is cut into four roundish segments; the petals are four, white, small, reflex, oval, and placed opposite to each other between the segments of the calyx; the filaments are numerous, longer than the petals, spreading, and rise from the calyx and upper part of the germen; the anthers are roundish and yellow; the style is smooth, simple, erect; the stigma obtuse; the germen becomes a round, succulent berry, containing two flat seeds.

The berries are gathered when green, and carefully dried in the sun. Their flavour is agreeably warm and aromatic, partaking of that of cloves. In pharmacy they often serve the purpose of more expensive spices, and are especially useful in covering nauseous and bitter flavours. The distilled water is a pleasant vehicle for saline purgatives and rhubarb, and the volatile oil (*Oleum Pimentæ*), which is of a reddish-brown colour, and heavier than water, is sometimes given in the dose of two or three minims, triturated with sugar, in cases of flatulent colic, or added to purgative pills and powders. The quantity yielded by a given weight of berries is very variable, fluctuating between one and five per cent.

AQUA PIMENTÆ.	PIMENTA WATER.
℞ Pimentæ contusæ, libram, *vel*	Take of Pimenta, bruised, a pound, *or*
Olei Pimentæ, drachmas duas,	Oil of Pimenta, two drachms,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos;	Water, two gallons;
Destillet congius.	Let a gallon distil.

When recently distilled, this water has a brownish hue, and slowly deposits a resinous sediment; in other respects, it keeps well, and retains its aromatic fragrancy.

PIPER CUBEBA, *see* CUBEBA.

PIPER LONGUM. Long Pepper. *Fructus immaturus exsiccatus.* The dried unripe fruit of the *Piper longum.* *Cl.* 2. *Ord.* 3. Diandria Trigynia. *Nat. Ord.* Piperaceæ.

This plant is a native of Malabar and Bengal. Its root is perennial, woody. Stems many, creeping, jointed, round, downy when young. Branchlets bearing the fruit erect, with the leaves sessile, or nearly so. Leaves on the creeping branches largest, stalked, broad-cordate, seven-nerved; on the erect fruit-bearing branchlets amplexicaul, oblong-cordate, five-nerved; all smooth, somewhat wrinkled; below, pale green. Stipules of the petioled leaves two, adhering to the petiole, and lanceolate; of the sessile leaves, intrapetiolar, single, spathiform. Spike sessile, opposite a leaf, stalked, erect, cylindrical, imbricated with five or more spiral rows of small orbicular scales. Ovaries sessile, suborbicular; stigma three or four-lobed. Spike of ripe fruit, subcylindrical, composed of firmly united, one-seeded drupes. Female spikes dried form the long pepper of the shops. The root and thickest part of the stems, cut into small slices, and dried, are much consumed for medical purposes in India, under the name of *Peppula Moola.* (*Lindley.*)

Long pepper is biting and pungent, but not aromatic. It contains piperin, acrid fatty matter, colouring and extractive matter, gum, and much bassorin, starch, woody fibre, malic and mineral acid salts. The ashes contain carbonate, sulphate, and chloride of potassium, carbonate and phosphate of lime, and traces of magnesia and oxide of iron. (J. Dulong. *Journ. de Pharm.*, XI., 52.)

This species of pepper is employed in several pharmaceutical formulæ, but there seem no good grounds for preferring it to the common, or black pepper. (Gr. πεπερι, from πεπτειν, *to digest:* because it assists digestion?)

PIPER NIGRUM. Black Pepper. *Baccæ.* The *berries* of the *Piper nigrum.* *Cl.* 2. *Ord.* 3. Diandria Trigynia. *Nat. Ord.* Piperaceæ.

This plant is cultivated in various parts of India and its islands, and also in the West Indies. Its stem is trailing or climbing, shrubby, flexuose, and dichotomously branched, jointed, swelling at the joints, and often throwing out radicles there, which adhere to bodies like the roots of ivy, or become roots striking into the ground. Leaves from four to five inches long, alternate, distichous, broadly ovate, acuminated, of a full green and glossy colour, paler beneath, five to seven-nerved, the nerves connected by lesser transverse ones or veins, and prominent beneath. Petioles rounded, from half an inch to nearly one inch long. Spikes opposite the leaves, chiefly near the upper ends of the branches; stalked, from three to six inches long, slender, drooping, apparently some male, others female, while sometimes the flowers are furnished with both stamens and pistil; stamens three. Fruit ripening irregularly all the year round, sessile, the size of a pea, at first green, then red, afterwards black, covered by pulp. (*Lindley.*)

The black pepper of commerce consists of the entire dried berries, with the pulp adhering. When in quantities, and recently unpacked, it has an agreeable and slightly aromatic odour. Its taste is intensely pungent, and a peculiar aroma resides in the skin or pulp. The acrimony of black pepper resides in a peculiar resin, exclusive of which it contains a distinct crystallisable principle, discovered by Oersted, and afterwards more accurately examined by Pelletier, which has been termed *Piperin.* (*Ann. de Chim. et Phys.*, tom. XVI.) It may be obtained as follows:—Digest sixteen ounces of coarsely-powdered pepper for forty-eight hours, in twice its weight of water, four or five times in succession; press out and dry the insoluble residue, and digest it for three days in twenty-four ounces of pure alcohol; press out this solution, filter, and evaporate it to the consistence of syrup; crystals are deposited, which, after having been freed from adhering resin by digestion in ether, are to be redissolved in alcohol, to which a little animal charcoal has been added, and, after filtration, set aside to crystallise.

Piperin forms quadrangular prisms of a yellowish tinge, insoluble in cold water, and very slightly soluble in boiling water; readily soluble in alcohol, less so in ether, and soluble in, but not combining with, the acids. It has little taste, and a slightly aromatic odour, and is fusible at 212°. The ultimate elements of piperin, are, according to Göbel—

Carbon	80·95
Hydrogen	8·13
Oxygen	10·92
	100·00

Alcohol is the most perfect solvent of the acrid principle of pepper; water also extracts it in considerable proportion. When purchased in the ground or powdered state, it is apt to be adulterated; and even the entire corns have been imitated by a farinaceous paste rolled into the figure of the berry. This fraud is detected by pouring boiling water upon the pepper, which disintegrates the spurious grains. The finest black pepper is generally termed *shot pepper*, from its density and hardness; that which is much wrinkled, or shrivelled, is of inferior quality.

According to Pelletier, black pepper contains—

An acrid resin.
Volatile oil.
Piperin.
Extractive.
Gum and Bassorin.
Starch.
Malic and tartaric acid.
Salts of potassa, lime, and magnesia.
Woody fibre.

What is called *white pepper* is the ripe berry stripped of its outer coat; for this purpose the berries are steeped in water, till their outer covering bursts; this is separated, and the pepper dried in the sun. In this state, it often has a nauseous putrescent odour. The over-ripe berries which fall off the plant lose their outer coat, and are sold as inferior white pepper. What is sold under the name of *decorticated pepper*, is black pepper deprived of its husk by mechanical trituration. It is sometimes bleached by chlorine.

Luca obtained from 100 parts of white pepper—

Volatile oil	1·61
Acrid resin (and piperin ?) . . .	16·60
Starch	18·50
Albumen	2·50
Gum with extractive and salts . .	12·50
Lignin	29·00
Loss in moisture, &c.	19·29
	100

The uses of black pepper as a condiment are well known. In pharmacy it ranks with the most powerful vegetable stimulants, and is sometimes usefully combined with bitters, in dyspeptic affections attendant upon gout, and in checking nausea, vomiting, and hiccup. In relaxed sore throat, a gargle of infusion of black pepper may be substituted for that of capsicum. Pepper has been extolled as a febrifuge, more especially in the treatment of intermittents, and has been used alone, and with various preparations of cinchona. It is said that piperin is more effective in curing the paroxysms of ague than sulphate of quinia, and it has the advantage of comparative tastelessness and cheapness. It has been given in eight or ten-grain doses, in powder.

A remedy known under the name of *Ward's Paste* has long been celebrated in the cure of hæmorrhoids, and of this, black pepper is the active ingredient. The following formula of the Pharmacopœia is intended for the same purpose. In inflammatory cases it is hurtful, but it may be given in the dose of one or two drachms in cases attended with debility and deficient secretion in the rectum.

Confectio Piperis Nigri.	Confection of Black Pepper.
℞ Piperis nigri, Inulæ, singulorum, libram, Fœniculi, libras tres, Mellis, Sacchari, singulorum, libras duas;	Take of Black Pepper, Elecampane Root, each, a pound, Fennel Seeds, three pounds, Honey (despumated), Sugar, of each, two pounds;
Arida simul in pulverem subtilissimum contere et in vase operto conserva. Quotiès autem confectione utendum est, adjecto melle contunde, donec corpus unum sit.	Rub the dry ingredients together to a very fine powder, and keep them in a covered vessel. But whenever the confection is to be used, the honey being added, pound them until they are thoroughly incorporated.

PIX ABIETINA. *Resina præparata.* The *prepared resin* of the *Pinus abies.* (*See* Abietis Resina.)

PIX LIQUIDA. Tar. *Resina præparata liquida.* The *prepared liquid resin* of the *Pinus sylvestris. Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Coniferæ. (The Scotch fir.)

This species of fir is indigenous in the north of Europe; it is a straight abruptly branched evergreen tree, with a rough brown bark; the leaves are short, linear, and pointed, issuing in pairs from a gray truncated sheath; the flowers are white, the male catkin is densely spiked, bracteated, elliptical, obtuse, with numerous scales on the upper side, and bearing a sessile anther on the under; the female is inferior, often terminate, peduncled, smooth, green, and changes into a small cone, bearing two winged seeds within each scale.

Tar is not a *prepared resin*, but an empyreumatic product obtained by a kind of distillation of the wood of the Scotch fir, which is cut into billets, and piled into a stack covered with turf; this is set fire to, and suffered to burn slowly, with the imperfect access of air; during this process the tar runs off at the bottom of the pile, and is collected in barrels. It is chiefly imported into England from Russia, Sweden, Denmark, and from the United States. *Tar-water*, prepared by pouring boiling water upon tar, was formerly employed as a diaphoretic and diuretic, and powerful alterative virtues were ascribed to it, but it has fallen into disuse. It has also been celebrated as an external application in ringworm, and some other cutaneous affections, but the eulogies which have been bestowed upon tar, in any of its therapeutic applications, appear ill deserved.

PIX NIGRA. Common Pitch. *Resina præparata solida.* "A solid *prepared resin*" of the *Pinus sylvestris.*

Pitch is inspissated tar; five barrels of tar yielding, on evaporation, about two of pitch, Its medical virtues resemble those of tar; it is limited to external use. The following ointments have a place in the Pharmacopœia, and are sometimes employed as detergent stimulants:—

Unguentum Picis Liquidæ.	Ointment of Tar.
℞ Picis liquidæ, Sevi, singulorum, libram;	Take of Tar, Suet, of each, a pound;
Liquefac simul, et per linteum exprime.	Melt them together, and press them through linen.

UNGUENTUM PICIS NIGRÆ.	OINTMENT OF PITCH.
℞ Picis nigræ,	Take of Pitch,
Ceræ,	Wax,
Resinæ, singulorum, uncias novem,	Resin, of each, nine ounces,
Olivæ Olei fluiduncias sedecim;	Olive Oil, sixteen fluid ounces;
Liquefac simul, et per linteum exprime.	Melt them together, and press them through linen.

PLUMBUM. Lead.

This metal is remarkable for its softness; it is of a gray colour, flexible, malleable, and ductile, and has considerable lustre. Its specific gravity is 11·4. Its fusing point is about 612°. It does not occur native in a metallic state, and its oxide is a very rare ore; some of its salts are of frequent occurrence, especially the carbonate; but its chief source is the sulphuret, which is known under the name of *Galena*. The reduction of this ore is a simple process; it is broken up and freed from its matrix, and heated to redness in a reverberating furnace, so as to burn off the sulphur; the reduced lead sinks to the bottom, and is run out into moulds; the scoriæ are again fused, with the addition of a portion of lime, and yield another batch of less pure metal.

The lead of commerce generally contains copper, iron, and traces of silver. When perfectly pure lead is required, it must be dissolved in nitric acid, and the resulting nitrate, after having being purified by two or three successive solutions and crystallisations, must be decomposed by heat, and reduced with a little black flux, in a crucible.

There are four oxides of lead, but of these the protoxide only is salifiable. It may be obtained by the exposure of red-hot melted lead to the air in a shallow vessel, stirring it so as to renew the surface; or by exposing nitrate or carbonate of lead to a sufficient heat for their decomposition. It was formerly called *Massicot*. It is yellow, but becomes bright-orange when heated. At a high red heat it fuses, and is converted into *Litharge*, the *Plumbi Oxydum Semivitreum* of the Pharmacopœia. It is readily soluble in many of the acids, and with others it forms insoluble compounds. It dissolves in the solutions of the fixed alkalis, and is easily reduced to the metallic state when heated to redness with charcoal, or subjected to the action of a current of hydrogen, or carburetted hydrogen gas. This oxide is also soluble to a certain extent in pure water, a fact which will be adverted to in considering the toxicological history of lead. The equivalent of lead, upon the hydrogen scale, is 104, and this oxide consists of—

	Atoms.	Equivalents.	Per Cent.
Lead	1	104	92·85
Oxygen	1	8	7·15
Protoxide of Lead	1	112	100·00

When the preceding oxide is heated in a shallow vessel freely exposed to the air, it gradually absorbs an additional portion of oxygen, and acquires a fine red colour, forming the pigment known in commerce under the name of *Minium*, or *red lead:* this compound is generally regarded as a *sesquioxide*, composed of 104 lead and 12 oxygen. When minium is digested in nitric acid, it is partly reduced to the state of protoxide, which is dissolved by the acid, and partly converted into *peroxide*, which remains in the form of a brown insoluble powder, composed of 104 lead, and 16 oxygen. When oxalate of lead is heated to dull redness, a dark gray powder remains, which is a suboxide or *dioxide* of lead, being composed of 2 atoms of lead and 1 atom of oxygen (208 lead + 8 oxygen).

When solutions of the salts of lead are decomposed by the fixed alkalis, the oxide falls in the form of a heavy white powder, which is considered as a *hydrated oxide of lead*, but whether or not of definite composition has not been ascertained. It is employed, according to the directions of the *London Pharmacopœia*, in the process for obtaining sulphate of quinia (see page 173), and the following formula is given for its preparation:—

Plumbi Oxydum Hydratum.	Hydrated Oxide of Lead.
℞ Liquoris Plumbi Diacetatis, octarios sex, Aquæ destillatæ, congios tres, Liquoris Potassæ, octarios sex, vel quantum opus est ad oxydum demittendum;	Take of Solution of Diacetate of Lead, six pints, Distilled Water, three gallons, Solution of Potassa, six pints, or as much as may be required to precipitate the oxide;
Misce. Quodque demissum est in aquâ lava donec alkalini nihil supersit.	Mix, and wash that which is precipitated in water till no traces of alkali remain.
Nota.	Note.
Plumbi Oxydum (*hydratum*). Quod in quinæ disulphate præparandâ adhibetur, oportet ex acido nitrico diluto totum liquari possit. Cætera sequenti respondent.	Oxide of Lead (*hydrated*). That which is used in preparing disulphate of quinia should be perfectly soluble in dilute nitric acid. In other respects it agrees with the following.
Plumbi Oxydum (*semivitreum*). Ex acido nitrico diluto ferè totum liquatur. Cætera ut in plumbi carbonate præcedente.	Oxide of Lead (*semivitreous*). It is almost entirely soluble in dilute nitric acid. In other respects it resembles carbonate of lead (which see).

The *chloride* and *iodide of lead* have each a place in the present Pharmacopœia; the former is used in the preparation of hydrochlorate of morphia, the latter as a remedial agent.

Plumbi Chloridum.	Chloride of Lead.
℞ Plumbi Acetatis, uncias novendecim, Aquæ destillatæ ferventis, octarios tres, Sodii Chloridi, uncias sex;	Take of Acetate of Lead, nineteen ounces, Boiling distilled Water, three pints, Chloride of Sodium, six ounces;
Plumbi Acetatem, et sodii chloridum separatim liqua, illam ex aquæ distillatæ octariis tribus, hoc ex aquæ destillatæ octario. Dein liquoribus inter se mixtis, quod demissum est, ubi refrixerit, aquâ destillatâ lava, et exsicca.	Separately dissolve the acetate of lead and the chloride of sodium; the former in three pints, and the latter in one pint of the distilled water; then, having mixed the solutions, wash the precipitate, when it has cooled, with distilled water, and dry it.
Nota.	Note.
Plumbi Chloridum (*crystallinum*). In aquâ destillatâ fervente totum liquatur. Hujus liquoris major	Chloride of Lead (*crystalline*). It is entirely dissolved by boiling distilled water. Of this solution, the greater

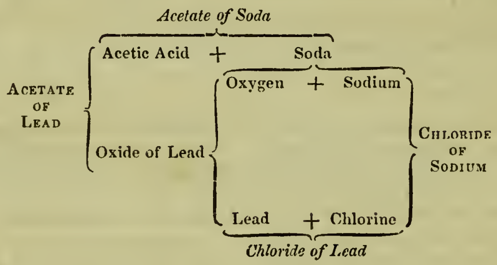
pars ubi refrixerit, in crystallos descendit. Adjecto acido hydrosulphurico fit coloris nigri. Igne flavescit.

part, on cooling, is deposited in crystals. On the addition of hydrosulphuric acid, it becomes of a black colour. It becomes yellow in the fire.

Chloride of lead, thus prepared, is in the form of a white powder, soluble in about thirty parts of cold, and twenty of boiling water. It has a sweetish taste, is fusible, and concretes, on cooling, into a horn-like mass, formerly called *Plumbum Corneum.* It consists of—

	Atoms.	Equivalents.	Per Cent.
Lead	1 . .	104 . .	74·3
Chlorine	1 . .	36 . .	25·7
Chloride of Lead	1 . .	240 . .	100·0

In the preceding formula the chloride of sodium, and the oxide of lead (of the acetate), mutually decompose each other, producing chloride of lead and soda; the chloride is precipitated, and the soda, combining with the acetic acid of the acetate, produces acetate of soda, which remains in solution. The following is an explanatory diagram:—



PLUMBI IODIDUM.

℞ Plumbi Acetatis, uncias novem,
Potassii Iodidi, uncias septem,
Aquæ destillatæ, congium;

Plumbi acetatem in aquæ octariis sex liqua et cola; iisque adjice potassii iodidum in aquæ octariis duobus priùs liquatum. Quod demissum est lava, et exsicca.

NOTA.

PLUMBI IODIDUM in aquâ fervente totum liquatur, et ex eâ, ubi refrixerit, in squamulas flavas micantes descendit. Calore liquescit et in vapores primùm flavos, mox et violaceos major pars dissipatur.

IODIDE OF LEAD.

Take of Acetate of Lead, nine ounces,
Iodide of Potassium, seven ounces,
Distilled Water, a gallon;

Dissolve the acetate of lead in six pints of water, and filter; to these add the iodide of potassium, previously dissolved in two pints of the water. Wash, and dry the precipitate.

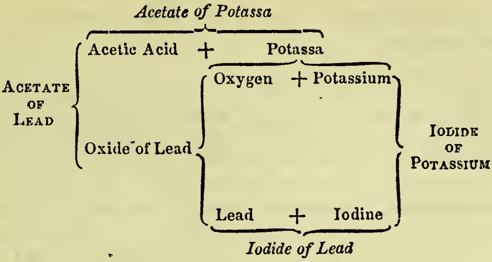
NOTE.

IODIDE OF LEAD is entirely soluble in boiling distilled water, and, as the solution cools, the iodide falls in yellow shining scales. When heated, it fuses, and the greater part is dissipated, first in yellow, and then in violet-coloured vapour.

Iodide of lead consists of—

	Atoms.	Equivalents.	Per Cent.
Lead	1 . .	104 . .	45·22
Iodine	1 . .	125 . .	54·78
Iodide of Lead	1 . .	229 . .	100·00

In the above formula for its preparation, the iodide of potassium and the oxide of lead (of the acetate) mutually decompose each other, producing iodide of lead and potassa; the latter unites to the acetic acid of the acetate to produce acetate of potassa, as in the following illustrative diagram:—



The use of iodide of lead is chiefly confined to external application, in the form of ointment; it is said to have dispersed obstinate and scrofulous glandular tumours: it has also been administered internally, in similar affections, but other iodic compounds are probably preferable, and equally effective. It has been given in the dose of from half a grain to four grains, in the form of a pill.

UNGUENTUM PLUMBI IODIDI.	OINTMENT OF IODIDE OF LEAD.
℞ Plumbi Iodidi, unciam,	Take of Iodide of Lead, an ounce,
Adipis, uncias octo;	Lard, eight ounces;
Tere et misce.	Rub and mix.

The only oxy-salts of lead directed in the Pharmacopœia, are the *carbonate* and the *acetate*, and of these the former is among the articles of the Materia Medica, where, also, the acetate might safely have been placed, for it is exclusively prepared by the wholesale manufacturer, and never according to the Pharmacopœia formula.

CARBONATE OF LEAD (*Plumbi Carbonas*) is the *white lead* and *ceruse* of commerce. It is prepared by various processes, but that which is preferred (on account of its density and other peculiarities, for the manufacture of white oil paint) is obtained by exposing lead cast into forms for the purpose, to the fumes of acetic acid; it becomes gradually, under these circumstances, converted into a carbonate, being oxidized and salified by the products of the decomposition of the acetic vapour. Carbonate of lead is also precipitated when carbonic acid is passed through solution of acetate, or subacetate, or subnitrate of lead, or by the mutual reaction of the alkaline carbonates and many of the salts of lead. Carbonate of lead is a tasteless white powder, insoluble in water, but soluble in many of the acids and in fixed alkaline solutions. Its specific gravity is about 6·4, but varies with the mode of preparing it. It occurs native, crystallised in the octoëdron and its modifications, and also in indeterminate fibrous crystals, of extreme delicacy and beauty. When heated, it loses carbonic acid, and leaves yellow protoxide of lead. It consists of—

	Atoms.	Equivalents.	Per Cent.
Protoxide of Lead	1	112	83·5
Carbonic Acid	1	22	16·5
Carbonate of Lead	1	134	100·0

Among the preliminary *Notes* of the Pharmacopœia is the following relating to this compound.

PLUMBI CARBONAS. Acido nitrico diluto, cum effervescentiâ, liquatur. Quod ex eo, per liquorem potassæ dejicitur, albet, et eodem suprà modum addito, iterùm dissolvitur; adjecto acido hydrosulphurico nigrescit. Igne flavescit et carbone simul addito in plumbum redigitur.	CARBONATE OF LEAD. It is dissolved with effervescence by diluted nitric acid. The precipitate thrown down from this solution by solution of potassa is white, and is redissolved by excess of the precipitant; hydrosulphuric acid blackens it. Carbonate of lead becomes yellow in the fire, and when charcoal is at the same time added, it is reduced to lead.

The therapeutic uses of carbonate of lead are limited to its occasional external applications; it is the principal source of lead-poisoning, and will be again referred to under the toxicological history of this metal. It is sometimes used as a cosmetic, and as an application to the excoriated cuticle of infants: the latter is a dangerous and improper remedy.

PLUMBI ACETAS.	ACETATE OF LEAD.
℞ Plumbi Oxydi in pulverem triti, libras quatuor et uncias duas, Acidi Acetici, Aquæ destillatæ, singulorum, octarios quatuor;	Take of Oxide of Lead in powder, four pounds and two ounces, Acetic Acid, Distilled Water, of each four pints;
Acidum aquâ misce, iisque plumbi oxydum adjice, et leni calore adhibito liqua: dein cola. Denique liquorem consume ut fiant crystalli.	Add the oxide of lead to the acid mixed with the water, and dissolve it by a gentle heat. Lastly, evaporate the solution that crystals may be formed.
NOTA.	NOTE.
PLUMBI ACETAS (*crystalli*). In aquâ destillatâ liquatur. A sodæ carbonate dejicitur alba, a potassii iodido flava. Præthereà, acido hydrosulphurico adjecto, nigrescit. Acidum sulphuricum adjectum odores aceticos elicit. Igne primùm liquescit et postea in plumbum redigitur.	ACETATE OF LEAD (*crystals*). It is soluble in distilled water; it is thrown down white by carbonate of soda, yellow by iodide of potassium. Moreover, on the addition of hydrosulphuric acid, it is blackened. Sulphuric acid being added, it exhales acetic odours. In the fire it first melts and afterwards is reduced into lead.

This salt, in consequence of its sweet taste, was formerly called *sugar of lead.* It occurs in crystalline masses, but by careful evaporation distinct crystals may be obtained, the primary form of which is an right oblique-angled prism (*see* PHILLIPS' *Translation of the Pharmacopœia*): they are permanent in the air, and soluble in about four parts of water. When the solution is exposed to air, it suffers partial decomposition, in consequence of the absorption of carbonic acid. The crystals include three atoms of water, and are composed of—

	Atoms.	Equivalents.	Per Cent.
Oxide of Lead	1	112	59
Acetic Acid	1	51	27
Water	3	27	14
Crystals of Acetate of Lead	1	190	100

Acetate of lead is a powerful sedative astringent; it is given in the dose of half a grain to three or four grains, (by some to a much greater extent) in the form of a pill, or dissolved with a slight excess of acetic acid: the facility with which it is decomposed and resolved into difficultly-soluble compounds requires that the adjuncts and vehicles should be carefully selected. Its principal use is in urgent cases of internal hæmorrhage, as of the lungs, stomach, or uterus; but in consequence of the spasm of the bowels, which it is apt to induce, it usually requires to be given with opium, and often with a mild aperient. In hæmoptysis, where the usual remedies, especially nitre and dilute sulphuric acid, fail, acetate of lead may be given, care being taken to avoid substances which decompose it, and especially sulphuric acid and sulphates, by which it is rendered inert. In hæmatemesis and in menorrhagia acetate of lead may also be had recourse to, but in all these cases the necessity of active measures for subduing febrile symptoms, where the inflammatory diathesis prevails, must not be lost sight of; nor should the patient be suffered to continue the use of the remedy for a length of time.

Regarding the safety of this remedy, very different opinions are entertained. Dr. Paris says, " I feel no hesitation in pronouncing this salt of lead to be one of the most valuable resources of physic; from the results of numerous cases, I state with confidence that it is more efficient in stopping pulmonary and uterine hæmorrhage than any other known remedy—' *nil simile, nec secundum;*' and that its application is equally safe and manageable; but it must not be combined with substances capable of decomposing it, nor must it be simultaneously administered with the medicines which are frequently prescribed in conjunction with it, as *infusion of roses, sulphate of magnesia, &c.*" (*Pharmacologia.*)

Dr. Thomson observes that, " it is a valuable remedy in pulmonary, uterine, and intestinal hæmorrhages, in restraining which it has a very powerful influence. Combining it with opium is supposed to prevent the deleterious effects which salts of lead are apt to produce, when taken into the stomach, but this is an erroneous opinion. It is more advantageously administered with diluted distilled vinegar, to prevent its change into the carbonate, which renders it poisonous. Some years ago Dr. Hildebrand of Lemburg tried this salt in combination with opium, with seeming advantage, in phthisis, and it has been since occasionally used in this country; but as far as I have observed, it is not likely to be generally employed by British practitioners. In every instance in which this salt causes *colica pictonum* it is converted into carbonate of lead, which, as I have already said, is the only poisonous salt of lead; thence the addition of distilled vinegar is necessary to prevent decomposition." (*Lond. Disp.*)

Dr. Thomson's opinion, however, respecting the harmlessness of acetate of lead, is not generally admitted; and indeed the well-known mischievous effects of cider, wine, and other acid beverages when contaminated by lead, seem decidedly to militate against it. Dr. Christison observes, that even supposing the carbonate to be more active than other compounds in occasioning colic and palsy, as Dr. Thomson's inquiries would tend to show, the fact may be admitted "without necessarily leading to the inference, that it is the *only* active compound of lead, or that other preparations must be converted into the carbonate, before they can act as slow poisons. For the superior activity of the carbonate may be owing to the great obstinacy with which its impalpable powder adheres to moist membranous surfaces, and the consequent greater certainty of its ultimate absorption. It certainly appears at least but consistent with a general law, to which hitherto no undoubted exception has been found, that the carbonate must be dissolved before it can act constitutionally." (*Treatise on Poisons.*)

Mr. Pereira remarks that "though Dr. Thomson has clearly shown that lead colic more frequently arises from the carbonate than from any other salt of lead, he has, in my opinion, failed in proving that no other preparation of lead *can* produce it. Indeed if his opinion were true, it would constitute an exception to the general effects of the metallic preparations; for we do not find that the specific effects of arsenic, or of mercury, or of copper, or of antimony are produced by one preparation only; so that, *à priori*, analogy is against the opinion. Furthermore, it is well known that the vapour of the oxide of lead taken into the lungs may produce colic, and that the ingestion of the acetate, citrate, and tartrate, of lead is capable of exciting the same effect. Now Dr. Thomson explains these facts by assuming that the oxide of lead unites with carbonic acid in the lungs, and thus is converted into carbonate; and that the acetate, citrate, and tartrate are decomposed in the alimentary canal, and converted into carbonate. But it appears to me much more simple and consistent with analogy to admit that these preparations are of themselves capable of producing colic, than to assume that they undergo the changes here supposed. Moreover, in some instances in which colic was produced, it is unlikely that these changes could have occurred, owing to the excess of acid taken with the salt of lead." (*Lond. Med. Gazette*, XVIII., 311.)

Bearing then in mind the dangerous consequences that may ensue from the improper or protracted use of the acetate, as well as of other soluble salts of lead, and the risk of administering it in unnecessarily large doses, it only remains to give a few of the formulæ for its administration.

℞ Plumbi Acetatis, gr. iv.
Pulveris Opii, gr. iij.
Confectionis Rosæ Caninæ, q. s.
Misce et divide in pilulas sex æquales, quarum sumatur una ter in die.

℞ Plumbi Acetatis, gr. iij.
Opii Pur. gr. j.
Extract. Conii, gr. x.
Fiat massa in pilulas tres dividenda, quarum sumatur una bis quotidie, superbibendo haustum aceticum.

℞ Plumbi Acetatis, gr. ij.
Aceti destillat. fʒj.
Aquæ Menthæ Piper. f℥j.
Syrupi Papaveris, fʒss.
M. fiat haustus.

℞ Plumbi Acetatis, gr. j. Solve in
Aquæ Rosæ, f℥j. et adde
Oxymellis, fʒj.
Tinctur. Opii, ♏v.
Tinctur. Digitalis, ♏x.
Fiat haustus quartis vel sextis horis sumendus.

The cases in which preparations of lead are used as external applications are very numerous; they furnish astringent and sedative remedies, and are chiefly prescribed in external inflammations; they also form the basis of several cerates and ointments, and of common plaster. The following are the officinal formulæ of the *London Pharmacopœia.*

Liquor Plumbi Diacetatis.	Solution of Diacetate of Lead.
℞ Plumbi Acetatis, libras duas et uncias tres, Plumbi Oxydi in pulverem triti, libram et uncias quatuor, Aquæ, octarios sex; Coque per horam dimidiam subindè agitans, et ubi liquor refrixerit, adjice aquæ destillatæ quantum satis sit, ut octarios sex impleat, denique cola.	Take of Acetate of Lead, two pounds and three ounces, Oxide of Lead in powder, one pound and four ounces, Water, six pints; Boil for half an hour, occasionally stirring, and when the liquor has cooled, add of distilled water as much as may be sufficient to make up six pints; lastly, strain it. (The specific gravity of this solution is 1,260.)

According to Mr. Phillips, this is a solution of an acetate of lead composed of two equivalents of oxide and one of acid; it is colourless, and very susceptible of decomposition, becoming milky when mixed with common water, owing to the presence of sulphuric and carbonic acid, and often rendered slightly turbid even when diluted with distilled water, which generally contains traces of carbonic acid. Its virtues were exorbitantly extolled by Goulard of Montpellier, whence the name *Goulard's Extract of Lead.*

Liquor Plumbi Diacetatis Dilutus.	Diluted Solution of Diacetate of Lead.
℞ Liquoris Plumbi Diacetatis, fluidrachmam cum semisse, Aquæ destillatæ, octarium, Spiritûs tenuioris, fluidrachmas duas; Misce.	Take of Solution of Diacetate of Lead, a fluidrachm and a-half, Distilled Water, a pint, Proof Spirit, two fluidrachms; Mix.

This is *Goulard's Saturnine Lotion.* It might have been conveniently left to extemporaneous prescription, for the degree of dilution in which it is desirable to apply the solution of subacetate of lead varies with the nature of the case. The object of the addition of so small a quantity of proof spirit to the above solution is not manifest.

The undiluted solution, applied upon lint, occasionally heals old and troublesome sores. Dr. Vetch recommends it as possessing great efficacy in altering the violently purulent state of the membrane in conjunctival ophthalmia; in opaque cornea, he remarks that it is the only substance which he has found beneficial, from its astringency upon the palpebral surface, without exciting hurtful consequences as a stimulus: he adds, that although this solution of lead, when undiluted, merely occasions a temporary sensation as if sand or gravel had got into the eye, yet it often causes much heat and smarting when diluted.

For collyria in inflamed conjunctiva, and for injections in gonorrhœa and gleets, the solution of acetate of lead is preferable to the diacetate. The proportion for eye lotions may be about eight or ten grains of the acetate to eight ounces of rose or elder-flower water; and for injections and lotions, twenty to thirty grains may be dissolved in the same quantity of water: these solutions must not be thickened with gum, because it forms an insoluble compound with the oxide of lead.

CERATUM PLUMBI ACETATIS.	CERATE OF ACETATE OF LEAD.
℞ Plumbi Acetatis contritæ, drachmas duas,	Take of Acetate of Lead in powder, two drachms,
Ceræ Albæ, uncias duas,	White Wax, two ounces,
Olivæ Olei, fluiduncias octo;	Olive Oil, eight fluid ounces;
Ceram in Olei fluidunciis septem liqua; tum his plumbi acetatem cum reliquo oleo separatìm contritam paulatim adjice, et spathâ move, donec coïerint.	Melt the wax in eight fluidounces of the oil, and then gradually add the acetate of lead, rubbed into powder, with the rest of the oil, and stir them with a spatula till they are mixed.

This is a good soothing application to inflamed surfaces, burns, scalds, and excoriations.

CERATUM PLUMBI COMPOSITUM.	COMPOUND CERATE OF LEAD.
℞ Liquoris Plumbi Diacetatis fluiduncias tres,	Take of Solution of Diacetate of Load, three fluid ounces,
Ceræ, uncias quatuor,	Wax, four ounces,
Olivæ Olei, octarium dimidium,	Olive Oil, half a pint,
Camphoræ, drachmam dimidiam;	Camphor, half a drachm;
Ceram liquefactam olei fluidunciis octo misce; tum ab igne remove, et, ubi primùm lentescant, liquorem plumbi diacetatis paulatim adjice, et spathâ assiduè move, donec refrixerint; denique his camphoram, in reliquo oleo liquatam, misce.	Mix the melted wax with eight fluid ounces of the oil; then remove them from the fire, and when first they begin to thicken, gradually add the solution of diacetate of lead, and stir them constantly with a spatula till they cool; lastly, mix them with the camphor dissolved in the remainder of the oil.

This cerate is applicable in the same cases as the former. "It is stated to be particularly serviceable in chronic ophthalmia of the tarsus, and for the increased secretion of tears, which so frequently affects the eyes of persons advanced in years." (*Phillips.*)

UNGUENTUM PLUMBI COMPOSITUM.	COMPOUND OINTMENT OF LEAD.
℞ Cretæ preparatæ, uncias octo,	Take of Prepared Chalk, eight ounces,
Aceti destillati, fluiduncias sex,	Distilled Vinegar, six fluid ounces,
Emplastri Plumbi, libras tres,	Plaster of Lead, three pounds,
Olivæ Olei, octarium;	Olive Oil, a pint;
Emplastrum in oleo, lento igne liqua, dein cretam aceto separatim mistam, effervescentiâ peractâ, paulatim adjice, et assiduè move, donec refrixerint.	Melt the plaster in the oil with a slow fire, then gradually add the chalk separately mixed with the vinegar, the effervescence being finished, and stir constantly till they are cool.

An ointment somewhat resembling this has long been used in the hospitals, under the name of *Neutral Cerate*, and is a soothing application to irritable sores, and at the same time improves the condition of indolent ulcers. But the ointment prepared as above-directed is too hard for use, and requires to be diluted by fusion with nearly an equal part of olive oil to render it soft enough to spread upon lint.

Emplastrum Plumbi.	Plaster of Lead.
℞ Plumbi Oxydi in pulverem subtilissimum triti, libras sex,	Take of Oxide of Lead, reduced to a very fine powder, six pounds,
Olivæ Olei, congium,	Olive Oil, a gallon,
Aquæ, octarios duos;	Water two pints;
Coque simul lento igne, assiduè movens, donec oleum et plumbi oxydum in emplastri crassitudinem coëant. Oportebit autem paululum aquæ ferventis adjicere, si ea ferè omnis, quæ in principio adhibita est, ante finem coctionis fuerit absumpta.	Boil them together over a slow fire, constantly stirring, until the oil and oxide of lead unite into the consistence of a plaster; but it will be proper to add a little boiling water, if nearly the whole of that which was used in the beginning should be consumed before the end of the boiling.

During the mutual action of the oil and oxide of lead at the temperature of 212°, or a little above it, the oil is saponified, and oleate and margarate of lead are produced; a considerable proportion of glycerine is at the same time set free, and retained in solution by the water, which should always be added in sufficient proportion, for when it is allowed entirely to evaporate, the glycerine is decomposed and the plaster spoiled; and unless water be present, no saponification results.

This plaster, when well prepared and spread upon linen, or occasionally upon leather, is a good application for the defence of excoriated surfaces, and is used to keep together the edges of wounds, and protect them from disturbance. It is less convenient for this purpose than adhesive plaster, but also less irritating. It is the *Diachylon Simplex* and *Emplastrum Commune* of former Pharmacopœiæ, and serves as the basis of many other plasters.

Toxicological History of Lead. From the frequent use which is made of lead, cases in which its deleterious effects upon the system manifest themselves, are by no means uncommon. It is usually employed in the construction of pipes and cisterns, for the conveyance and retention of water, and, under certain circumstances, water may become impregnated with it to a very dangerous extent. Leaden vessels are also often used for the preservation of articles of food; salted provisions are not unfrequently prepared and preserved in them, and, they are sometimes used as reservoirs for milk. Vessels of earthenware, too, are not uncommonly glazed with oxide of lead, and when acted upon by acid, or alkaline liquids, are corroded, and give rise to injurious contamination. In consequence of the sweetness of the salts of lead, and the neutralising power of its oxide, it has been resorted to as a means of correcting acidity in wines, and other fermented and spirituous liquors; and, lastly, its mischievous effects often exhibit themselves in persons who are employed in arts and manufactures connected with it; as in painters, paper-stainers, glaziers, makers of white lead and of sugar of lead, potters, plumbers, sheet-lead, shot, and lead-pipe makers, glass-blowers, miners, and the persons employed in reducing the ores.

The action of water upon lead has already been adverted to (*see* AQUA), but it may be right here to enter into some further details, since it is obviously a very important inquiry. It is noticed by Galen, and Vitruvius condemns the use of leaden water-pipes; but the subject was not further examined into till the beginning of the present century, when Guyton Morveau pointed out the curious fact of the rapid action of *distilled* water upon metallic lead, and the preventive influence of certain saline substances which common waters generally hold in solution. (*Ann. de Chim.*, 1809, tom. LXXI.) In 1829, much valuable information respecting the action of different waters upon lead was communicated by Dr. Christison, in his *Treatise on Poisons*, and more lately some further remarks upon the subject have been published by Captain Yorke, in the *Phil. Mag.* (third series, 1834.)

When pure distilled water, which by long boiling has been perfectly deprived of air, is brought into the contact of bright lead in a perfectly air-tight bottle, the metal is not tarnished, nor does the slightest apparent action ensue. But if a strip of bright lead be put into ordinary distilled water, its surface becomes dingy in the course of a few minutes, and if this experiment be made in an open, and especially in a shallow vessel, a white powder soon appears around the lead, and rapidly increases, so that, in a few days, it is abundantly deposited upon the metal and at the bottom of the vessel. This corrosion goes on as long as air is allowed access to the water, and is rapid in proportion to the care which has been taken in ensuring its purity. Thus, if a gallon of distilled water be so far redistilled at a low temperature as to allow one-half to pass over, the redistilled portion in the receiver will be found more active than the residuary portion in the retort; for the minute quantity of foreign matters contained in common distilled water, interferes with the rapidity of its corrosive action upon the lead. Dr. Christison states that, in twelve ounces of distilled water, contained in a shallow glass basin, loosely covered to exclude the dust, twelve brightly-polished lead rods, weighing 340 grains, will lose two grains and a-half in eight days, and the lead will then show evident marks of corrosion; and from an ounce of lead in the form of rods, kept for twenty months in twenty-four ounces of distilled water, covered by a large bell jar, he obtained 120 grains (of deposit?). "During these changes," observes Dr. Christison, "a very minute quantity of lead is dissolved: this is best proved by carefully filtering the water, then acidulating with a drop or two of nitric acid, and evaporating to dryness; a solid and sometimes crystalline residue is thus procured, in which, after expelling the excess of nitric acid by heat, I have never failed to detect lead by dissolving the residue in distilled water, and applying sulphuretted hydrogen, hydriodate of potass, and chromate of potass, to the solution. Frequently, however, as Captain Yorke found, sulphuretted hydrogen will act on the original water without any such preparation, occasioning first a brown colour, and subsequently a black precipitate. He estimates the quantity, when the water is saturated, at one 10000th part."

When, as in the preceding cases, clean lead is introduced into perfectly pure water, the surface of the metal becomes immediately covered with a film of oxide, which is dissolved by the water, and subsequently converted into insoluble carbonate of lead, by the carbonic acid which the water absorbs from the air; in this way, successive films are dissolved and precipitated, until a considerable quantity of carbonate of lead is found in the deposited white powder, which consists partly of that salt and partly of hydrated oxide.

It is evident, therefore, that distilled water should not be kept in leaden vessels; orange-flower water, which is frequently kept in copper bottles soldered with lead, is often dangerously contaminated, but in that case, galvanic action may be also concerned. Close examination will also generally enable us to detect traces of lead in waters which have been distilled through a leaden worm. The same precaution is requisite in regard to rain and snow water, and to the water of certain springs. In regard, however, to *common* river or spring-water, it is well known that it may not only be conducted through leaden pipes, but retained in leaden cisterns, with comparative, and generally, with perfect impunity. This arises from the protective influence of the saline ingredients of such waters, which, though present in very small quantity, exert a remarkable preservative power against that kind of action which has been described as belonging to distilled water. Sulphate of lime, sulphate of soda, chloride of sodium, carbonate of lime, and sulphate of magnesia, are substances commonly contained in water, and are effective preventives in regard to the solvent power of such water upon lead; so that, when kept in contact with lead, and filtered, no traces of the metal are discoverable in the filtered portion. Minute quantities of insoluble compounds of lead may, however, in such cases, be sometimes *diffused* in the water, but the risk even of this contamination is temporary only, and after the water has been for a short time in the contact of the lead, an insoluble and protective film forms upon its surface, and firmly adheres to it; so that the lead augments, instead of decreasing in weight. This is the curious cause of the impunity with which lead is so constantly employed in the construction of pumps, water-pipes, and cisterns. But, it must be recollected, that *some waters* may be to a greater or less extent contaminated by passing through or retention in lead, and especially in *new* pipes and cisterns. This may arise from two causes; either from the extreme purity of the water (approximating it to distilled water), or, which is more frequently the case, from galvanic action. Of the former source of contamination I have met with three instances; one at Tonbridge Wells, and two in the neighbourhood of London. But in these cases, though the presence of lead in the water was at first to an alarming extent, it gradually decreased, and at length disappeared, owing, no doubt, to the formation of an insoluble superficial film, or crust.

In respect to galvanic action, its mischievous influence may be variously produced; it sometimes arises where the sheet lead and solder are in contact, and more frequently from the introduction of iron bars, screws, or pipes, or of some other metal, into the contact of lead, or from some accidental impurities or inequalities of composition in the metal itself. And in these cases, owing to the action of alkaline bases, as well as of acids, upon the lead, danger may occur not only where it is thrown into an electro-positive state, but also where it is rendered electro-negative.

The rapid corrosion which leaden pipes are in some cases known to have undergone, and supposed instances of extraordinary solvent powers of certain waters, are referable to such causes; so that whenever any new work has been done, or any new arrangement made in regard to the supply of water for domestic use, it should be carefully examined, and if any contamination exist, the cause should be immediately traced out and ascertained: if it arise from the mere ordinary action of the water upon the clean metallic surfaces, it will probably soon cure itself, or may be prevented, where possible, by allowing the water to remain for some time in the pipes and cisterns before they are used; previous to which they should be well cleansed by allowing a current to pass through them; they may then be employed as usual, taking the precaution of previously testing the water. In some cases, too, the method suggested by Dr. Christison of filling the pipes for a considerable period before they are used, with water holding some preventive salt in solution, may be adopted. For this purpose he recommends water, containing about one 25000th of phosphate of soda. But in general, any common *hard* water would answer the purpose. Where pumps are used to raise water from a well, more circumspection is requisite than in other cases; the friction of the piston, and the lodgment of the water in different parts of the pump, and galvanic causes, may here co-operate to produce contamination; the first portions of water delivered by the pump will, of course, be especially liable to it. In all these cases, the two states in which lead may occur must be borne in mind; the case of *solution* in the water is rare; that of *diffusion*, more common.

There is another method in which water may become tainted by lead, arising out of the use of leaden covers to tanks and cisterns, upon which vapour may condense, and drop back into the bulk of the water; it will, of course, act as distilled water.

Acidulated waters act upon lead and its oxides with different degrees of rapidity, and by sulphuric acid its action is considerably impaired. Dr. Christison found that if it contained one 4000th, or even only one 7000th of sulphuric acid, fifty grains of lead, kept in it for thirty-two days, gained a seventh or twelfth of a grain in weight, and were covered with crystals of sulphate of lead; a minute trace of lead was also detected in the water. Hydrochloric acid he found more active as a solvent; distilled water containing one 3000th of that acid acquired, in thirty-two days, a sweetish taste, and yielded, by evaporation, a considerable quantity of chloride of lead, while the lead rods lost weight, and were covered with acicular crystals of the same salt.

But the most common source of contamination with lead is referable to the vegetable acids. Under ordinary circumstances, *acetic acid* soon attacks metallic lead; *citric acid* acts less, and *tartaric acid* still less energetically. If the lead be in the state of oxide, these actions are more rapid; so that the preservation of articles of food in vessels either of lead or glazed with lead, is always hazardous. Milk has been rendered poisonous by keeping it in leaden troughs, and rum has been similarly contaminated apparently by passing through a leaden worm-pipe. Shot left in bottles has rendered wine poisonous, and the use of lead in the apparatus for making cider has led to the mischievous impregnation of that beverage. Both wine and cider have also been intentionally adulterated by lead in order to cover their acescency. Vinegar and pickles inadvertently kept in vessels of earthenware glazed with oxide of lead, have also been rendered poisonous from the solvent power of that acid.

Detection of Lead. It fortunately happens that lead is easily detected, and that several simple tests enable us unequivocally to ascertain its presence, even when in very minute quantity. Among these none is more effective than a saturated aqueous solution of *sulphuretted hydrogen*, which throws down a black precipitate of sulphuret of lead in all solutions of the metal, and blackens or discolours its insoluble combinations. It is true that there are several other metals which are similarly precipitated by this reagent, such as mercury, bismuth, silver, and copper; but these may be identified by other tests, and are not likely to occur where lead is usually looked for. *Iodide of potassium* is also a valuable distinctive test of the soluble salts of lead; it produces with them a bright yellow precipitate of iodide of lead. *Chromate of potassa* also occasions a yellow precipitate of chromate of lead in similar cases. Lastly, when a slip of *zinc foil* is immersed in solutions of lead, small brilliant crystals of metallic lead are gradually deposited upon it. "This," says Dr. Christison, "is a very characteristic test, and also one of much delicacy, for I have found a small thread of zinc will very easily detect a twentieth part of a grain of lead dissolved in the form of acetate in 20000 parts of water. It acts also on the nitrate of lead. Its action is impaired or prevented by an excess of acetic or nitric acid." That zinc similarly precipitates many other metals, must also be borne in mind.

When lead is sought for in mixed fluids in which organic matters are also present, the following method has been recommended by Dr. Christison. A little nitric acid should be added to the suspected matter before filtration, to dissolve compounds of the salts of lead with albumen and other vegetable and animal principles; sulphuretted hydrogen should then be transmitted through the filtered fluid, and if a dark-coloured precipitate is formed, the whole is to be boiled and filtered to collect the precipitate. To ascertain that the precipitate contains lead, it may either be reduced before the blowpipe, or it may be heated to redness in a tube, and then treated with a little nitric acid, which will dissolve the lead. The solution is then to be diluted, filtered, evaporated to dryness, and gently heated to expel the excess of nitric acid. If the residue be dissolved in water, it will present the characters of lead to proper tests, among which iodide of potassium is to be preferred when the quantity is too small to use others; but all excess of nitric acid must have been previously carefully expelled, since excess of that acid may of itself induce a yellow tint in the test.

If by this process lead is not discovered in the filtered portion of the mixed fluid, the matter upon the filter must be incinerated, and the residuum dissolved in nitric acid, and treated as above. When, in cases of lead poisoning, any sulphate or phosphate has been given as an antidote, the process of incineration must be adopted; otherwise it should, as far as possible, be avoided in medico-legal analysis, as it is not easily managed by unpractised persons.

Effects of Lead Poisons. In large doses the soluble salts of lead produce the general symptoms of irritant poisoning, subject, however, to some peculiarities. Orfila found it impossible to bring dogs under the full influence of the acetate in solution, because it was discharged by vomiting; but if retained by a ligature on the œsophagus, or given in powder to the extent of half an ounce, violent irritation was succeeded by great debility and death, sometimes within nine hours, but generally not till the second day. The villous coat of the stomach was found unnaturally white where death was rapid, and vascularly red when death was more protracted. When thirteen grains of acetate of lead were injected into the jugular vein, death ensued almost immediately, preceded only by convulsive respiration. When only five grains were so injected, the dog lived for five days, the symptoms being languor, staggering, and slight convulsions, none of which, however, appeared till the third, and no morbid appearance was found in either animal on dissection. Nitrate of lead, in the dose of 400 grains, was found by Dr. Christison to be powerfully irritant and corrosive; when this dose, dissolved in four ounces of water, was administered to a large dog, and secured in the stomach by a ligature, it produced violent diarrhœa, and efforts at vomiting, and death in sixteen hours. After death, the inner membrane of the gullet and stomach, and the villi of the upper half of the small intestines, were found uniformly white, brittle, and disintegrated, and the mucous coat of the great intestines was bright red, in parallel lines. Death is also occasioned by applying acetate of lead to a wound, and, according to Campbell and Gaspard (the authorities quoted by Dr. Christison), it acts in these cases like arsenic upon the alimentary canal, analogous appearances being observed after death, and purging, tenesmus, and dysentery during life. It appears, also, that in continued small doses, lead produces in animals the peculiar colic and palsy which characterise its action upon the human system.

The important question regarding the presence or absence of lead in the blood of persons poisoned by it, has not been satisfactorily determined; Schloepfer, Baruel, and Merat could not detect it either in the flesh, urine, or fæces; very different results, however, have been obtained by Dr. Wibmer, a German physiologist, quoted by Dr. Christison (*On Poisons*, chap. XVIII., § 2): "He poisoned two dogs, one with sugar of lead, given in small doses daily, to the amount of two drachms and eight grains in the course of thirty-seven days, the other with white lead, given to the extent of two drachms in fourteen days, at the end of which periods the animals died. In both, there was frequent vomiting and gradually increasing weakness and stiffness of the legs. In the dead body, the only unusual appearance was an overflow of dark greenish yellow bile, which distended the gall-bladder, and lined the whole stomach and intestines. Various fluids, and several of the soft solids, were carefully examined for lead, and Dr. Wibmer succeeded in discovering it distinctly in the liver and the muscles, but especially in the spinal chord, while a mere trace only could be found in the blood, and none at all in the bile, urine, or brain. The process of analysis consisted simply in deflagrating the matter for examination with nitre, acting on the residue with nitric acid, filtering and neutralising the solution, and testing it with sulphuretted hydrogen, carbonate of potassa, and iodide of potassium."

These remarkable experiments are supposed to account for the symptoms produced by lead poisons, by showing that they are concentrated in the muscular and spinal system; but, when repeated by Dr. Christison, no trace of lead could be detected in the spinal, and it was only very faintly indicated in the lumbar muscles. Dr. Christison also adverts to a probable source of fallacy to which these experiments may possibly be exposed, arising out of traces of the presence of *copper* in animal solids and fluids, as announced by M. Sarzeau.

In the human subject large doses of the soluble salts of lead act as irritant poisons, followed frequently by spasms and colic; they are not generally violent in their operation, and acetate of lead has been occasionally administered to the amount of from twenty to thirty grains daily, without exciting alarming symptoms; there is, however, that uncertainty in its effects which should lead to circumspection in the medicinal use of that salt.

But the mischievous consequences of lead poisons are most commonly observed as a result of the gradual introduction of the metal into the system, when it brings on the disease called *Colica Pictonum;* from the places where it prevails it has been termed the Poictou and Devonshire colic; or from those who are common sufferers from it, the plumbers' or *painters' colic.*

The symptoms with which it commences are very variable; it is sometimes sudden in its attacks, and at first resembles common colic; there is pain about the region of the navel, and obstinate constipation, attended by frequent but ineffectual desire to evacuate the bowels. The pain, however, and other symptoms are much dependant upon the circumstances under which the poison has been introduced into the system, so that there is an acute and chronic form of the disease. Loss of appetite, nausea, occasional vomiting, and excessive anxiety and restlessness, are symptoms which frequently harass the patient for several weeks; and, in some cases, a kind of delirium or mania succeeds, which, however, is not to be considered as alarming, since it goes off with the other symptoms. In general, neither the pulse nor the tongue are materially affected, except that the former is quickened during the paroxysms, the pain of which often appears to be in some measure relieved by pressure, and by keeping the trunk bent upon the knees, a position frequently observed in sufferers from this colic, and which leads to a distinction between it and inflammation of the bowels.

The principal symptoms of this disorder appear to arise from a spasmodic affection of the intestinal canal, and chiefly of the colon; the fæces, thus confined, become hard and irritating; the treatment, therefore, consists in allaying spasm, so that aperients may become operative, and evacuating the bowels by the least irritating means; opium, therefore, should be conjoined with gentle aperients, such as castor oil, and small doses of sulphate of magnesia.

Warm fomentations, opiate clysters, and the hot bath, are useful remedies; and where fluids are rejected by vomiting, a pill of calomel, aloes, and opium may be prescribed. When the bowels are relieved, and brought to their natural state, the symptoms of the disease give way, provided it has been attacked at an early period, and further ingress of the poison avoided. But where it has long existed in a chronic form, or where the acute attacks have been often repeated, other symptoms arise: such as attacks resembling epilepsy, and a paralytic affection of the hands, the wrist becoming, as it were, loose and flaccid, and soft and hard tumours arise on the back of the hand, the former being the enlarged sheaths of the tendons of the extensor muscles, the latter, the swollen heads of the metacarpal bones: the adductor muscles of the thumb also waste away. But even where the disorder has attained this height, proper treatment, with great attention to the bowels, the application of splints, so as to keep the hand supported in a straight line with the fore-arm, and the occasional use of blisters to the wrist, will generally succeed in curing the prevailing symptoms; ultimate recovery is, however, slow and doubtful, and some of the effects of the malady usually haunt the patient during his life. It is, above all things necessary to remove sufferers under this complaint from all possible sources of the poison which brought it on, and to insist upon extreme cleanliness in clothes and person; to give them air, and such exercise as they can endure; and to enjoin a nutritious, but not stimulating diet. Where these precautions and proper treatment are neglected, they become incredibly emaciated, the epileptic attacks frequent, palsy more general, and they die a lingering death.

There are well-authenticated cases of the occurrence of lead-colic as a consequence of the protracted use of sugar of lead and of saturnine ointments and lotions, and though these are not so frequent as they have been represented, the possibility of their occurrence must be borne in mind whenever lead is internally or externally used.

Cases of poisoning by large doses of sugar of lead are effectively treated by the adequate exhibition of the alkaline sulphates, such as sulphate of soda and sulphate of magnesia; these decompose the acetate, and form with its basis an insoluble and inert sulphate of lead: upon the same principle, phosphate of soda is an excellent antidote in cases of irritant poisoning by any salt of lead. With these chemical preventives, an emetic of sulphate of zinc may be given, where vomiting has not ensued; in other respects, the treatment will be the same as that of other cases of irritant poisoning; opiates and mild aperients being especially indicated.

PORRUM. *Bulbus.* The *bulb* of the *Allium Porrum.* *Cl.* 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Liliaceæ.

The leek is a biennial, and a native of Switzerland; it flowers in June. The bulb consists of concentric layers upon a radical plate; the leaves are broad, and the stem a naked scape, bearing a spherical umbel of flowers, with rough-keeled petals, shorter than the stamens. It is a stimulant, possessing the general properties of garlic, but considerably milder. It is an excellent pot-herb, but no good reason can be given for retaining it in the list of the Materia Medica.

POTASSIUM. This metal is the basis of a numerous and important class of pharmaceutical agents, some of which are included in the list of the Materia Medica, and others inserted among the "Præparata et Composita" of the Pharmacopœia.

It is unnecessary here to describe the process for obtaining potassium, the details of which will be found in chemical works; it consists in decomposing the hydrate of potassa, by the action of charcoal or of iron, at a high temperature.

Potassium was originally obtained, in 1807, by Sir Humphrey Davy, who first decomposed potassa by the agency of the Voltaic pile: it is a metal of most extraordinary properties; it is blueish-white, and of great brilliancy, but instantly tarnishes on the exposure of its recently-cut surface to the air; it is considerably lighter than water, its specific at 60° being 0·86. At the temperature of 32° it is hard, brittle, and crystalline; at 60° to 70° it admits of extension by pressure, and has the consistency of wax; at 150° it enters into perfect fusion; and at a red heat it boils and is rapidly converted into a green vapour, so that at that temperature it admits of distillation in close vessels. In contact of air it gradually absorbs oxygen, and the surface becoming converted into potassa, soon deliquesces, so that it must be preserved out of the contact of air and moisture; this is most easily effected by immersing it in naphtha, or other liquid hydrocarbon. It is a good conductor of heat and electricity. When heated in the air it fuses and takes fire, burning with a bright purplish flame into dry oxide of potassium. When thrown upon water, it moves rapidly about upon the surface of that liquid, bursts into flame, and is quickly converted into potassa, which immediately dissolves. When plunged under water, potassium decomposes it with explosive violence; and hydrogen gas is liberated, the volume of which may be assumed as the equivalent of the oxygen transferred to the metal; it is found that 100 parts of potassium thus absorb 20 of oxygen, so that potassa (being the protoxide of potassium) consists of—

	Atoms.	Equivalents.	Per Cent.
Potassium	1	40	83·34
Oxygen	1	8	16·66
Potassa	1	48	100·00

The substance usually called *pure* or *caustic potassa* is a *hydrate* of the above oxide, and consists of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	84·2
Water	1	9	15·8
Hydrate of Potassa	1	57	100·0

Having premised thus much respecting the properties of potassium and the composition of potassa and its hydrate, we may now more particularly notice its combinations. Of these, the *Carbonate* may be first adverted to, as the source of the pure alkali and many of its salts.

The *Potassæ Carbonas impura* of the Materia Medica, is the product generally termed *pearl-ash;* it is almost exclusively obtained by the combustion of wood, the lixivium of the ashes of which yields, on evaporation, the alkaline substance called *potash*, which after having been heated in a proper furnace so as entirely to burn off all carbonaceous matter, is rendered more pure and white, and exported under the name of pearl-ash, or *impure carbonate of potash:* it, in fact, still contains a variety of impurities, which materially affect its value in the market. Its purity or actual value can only be accurately ascertained by determining its saturating power in regard to acids, by a process of *alkalimetry.* 100 grains of nitric acid of the specific gravity of 1·36 will saturate 65·7 grains of pure and dry carbonate of potassa, which are equivalent to 45 parts of pure potassa: or 355 grains of diluted sulphuric acid of the specific gravity of 1·141 exactly neutralise 100 grains of pure carbonate of potassa: upon either of these data, therefore, the relative commercial values of different samples of pearl-ash may be determined: for the details of the process, and the precautions requisite in its performance, the reader is referred to the article *Alkalimetry* in Mr. FARADAY'S *Chemical Manipulation.* The following directions are given in the Pharmacopœia, respecting the purification and properties of this carbonate.

POTASSÆ CARBONAS.	CARBONATE OF POTASSA.
℞ Potassæ Carbonatis impuræ, libras duas, Aquæ destillatæ, octarium cum semisse;	Take of Impure Carbonate of Potassa, two pounds, Distilled Water, a pint and a-half;
Liqua potassæ carbonatem impuram in aquâ, et cola; tum in vas idoneum effunde, et aquam consume, ut spissescat liquor; dein spathâ assiduè move, donec sal concreverit.	Dissolve the impure carbonate of potassa in the water and filter; then pour the solution into a proper vessel, and evaporate the water, stirring it assiduously when it begins to thicken, till the salt concretes.
Potassæ carbonas magis pura præparari potest ex crystallis potassæ bicarbonatis ad rubedinem ustis.	Carbonate of potassa of greater purity may be prepared by heating crystals of bicarbonate of potassa to redness.
NOTA.	NOTE.
POTASSÆ CARBONAS. In aquâ ferè omnis liquatur; tum in vase aperto, sponte suâ liquescit. Curcumæ colorem in fuscum mutat. Ubi acido nitrico supersaturata est, nihil indè demittit nec sodæ carbonas, neque barii chloridum, neque, nisi parcissimè, argenti nitras. Hujus partes 100 in igne acri 16 aquæ amittunt; tantundem adjecto acido sulphurico diluto 28 partes acidi carbonici emittit.	CARBONATE OF POTASSA. Almost entirely dissolved by water; it spontaneously liquefies in an open vessel. It changes the colour of turmeric to brown. When it is supersaturated by nitric acid, neither carbonate of soda nor chloride of barium throw down any thing, and nitrate of silver very little. 100 parts lose 16 of water, by a strong heat; the same quantity loses 28 parts, (26·3?) of carbonic acid.

Carbonate of potassa can scarcely be so far purified by the above means as to stand the proposed tests: when it is perfectly free from earthy impurities, it is entirely soluble in water, and if, after supersaturation with pure nitric acid, it is not affected by carbonate of soda, chloride of barium, or nitrate of silver, it neither contains earthy salts, nor sulphates, nor chlorides: traces of silica, however, adhere to it with great obstinacy. Where it is required of extreme purity, the decomposition of the crystallised bicarbonate, as above stated, must be resorted to, but for all ordinary pharmaceutical use, trifling impurities are unimportant.

Carbonate of potassa usually occurs in the form of a white granular powder, of a pungent alkaline taste, very deliquescent, and soluble in its own weight of water; it has a strong alkaline reaction on vegetable colours. It is insoluble in alcohol. In its dry state it is composed of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	68·5
Carbonic Acid	1	22	31·5
Carbonate of Potassa	1	70	100·0

Carbonate of potassa may be obtained in crystals by suffering a solution of it, of the specific gravity of 1·62, to cool slowly in a tall cylindrical vessel; these crystals contain, according to Berard, 2 atoms of water. Mr. Phillips regards the salt prepared as above directed, as a *sesquihydrate*, and composed, therefore, of—

	Atoms.	Equivalents.	Per Cent.
Carbonate of Potassa	1	70	84
Water	1½	13·5	16
Potassæ Carbonas of the Pharmacopœia	1	83·5	100

LIQUOR POTASSÆ CARBONATIS.	SOLUTION OF CARBONATE OF POTASSA.
℞ Potassæ Carbonatis, uncias viginti; Aquæ destillatæ, octarium; Liqua potassæ carbonatem in aquâ, et cola.	Take of Carbonate of Potassa, twenty ounces, Distilled Water, a pint; Dissolve the carbonate of potassa in the water, and filter.

This solution was formerly known under the name of *Lixivium Tartari;* or, as obtained by the deliquescence of the carbonate exposed in a shallow vessel to moist air, it was termed *Oleum Tartari per deliquium.*

POTASSÆ BICARBONAS.	BICARBONATE OF POTASSA.
℞ Potassæ Carbonatis, libras sex, Aquæ destillatæ, congium; Potassæ carbonatem in aquâ liqua dein acidum carbonicum per liquorem transmitte usque ad saturationem. Lenem calorem admove, ut quæcunque factæ sint crystalli, rursùs solvantur. Tunc sepone ut denuò prodeant crystalli. Has effuso liquore exsicca.	Take of Carbonate of Potassa, six pounds, Distilled Water, a gallon; Dissolve the carbonate of potassa in the water, then transmit carbonic acid through the solution till it is saturated. Apply a gentle heat, that any crystals which may have been formed may again be dissolved. Then set aside the solution, that crystals may be again produced. The liquor being poured off, dry them.

Acidum carbonicum facillimè elicitur ex cretâ, in pulverem tritâ et aquâ mixtâ ad syrupi crassitudinem, cui acidum sulphuricum deindè superinfunditur pari pondere aquæ dilutum.

Nota.

Potassæ Bicarbonas (*crystalli*). In aquâ omnis liquatur, et curcumæ colorem leviter mutat. Nihil, ex hoc liquore, nisi calore adhibito, demittit magnesiæ sulphas. E partibus 100, expelluntur 30·7, igne rubente. Acido nitrico suprà modum priùs addito, nihil ex hoc demittit nec barii chloridum, nec nisi parcissimè, argenti nitras.

Carbonic acid is very easily evolved from chalk rubbed into powder, and mixed with water to the consistence of syrup, upon which sulphuric acid is then poured, diluted with an equal weight of water.

Note.

Bicarbonate of Potassa (*crystals*). Wholly dissolved by water, and the solution slightly changes the colour of turmeric. Sulphate of magnesia throws down nothing from this solution unless it be heated. From 100 parts, 30·7 are expelled by a red heat. After the addition of excess of nitric acid, chloride of barium throws down nothing, and nitrate of silver very little or nothing.

Turmeric paper is strongly reddened, and solution of sulphate of magnesia is rendered turbid, if the carbonate is not entirely converted into bicarbonate of potassa. The loss of 30·7 per cent., at a red heat, consists of carbonic acid and water; the residue is carbonate of potassa. The absence of sulphate of potassa is shown by the non-action of chloride of barium upon a solution of the salt supersaturated by pure nitric acid, and if nitrate of silver renders such solution milky, a trace of chloride of potassium is present.

No explicit directions are given in the above formula as to the mode of saturating the solution with carbonic acid, or the apparatus in which it is to be effected: one precaution is especially necessary, which is, that the carbonic acid should be washed before it is passed into the solution of the carbonate. If sulphuric acid, diluted with its weight of water, be used to extricate the carbonic acid, the chalk or whiting should be previously reduced to the consistency of thick cream by mixture with water, and the acid should be suffered to trickle slowly into it under constant stirring. If dilute hydrochloric acid be substituted for the sulphuric, powdered white marble may be used instead of whiting.

Bicarbonate of potassa forms crystals, which are modifications of a right oblique-angled prism (see Phillips' *Translation of the London Pharmacopœia*). It is soluble in about four parts of cold water; the solution tastes slightly alkaline, and feebly reddens turmeric paper. When boiled, it loses carbonic acid, and gradually becomes a *sesquicarbonate*. At a red heat, it loses 1 atom of carbonic acid, together with its water of crystallisation, and an anhydrous carbonate of potassa remains. The crystals are composed of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	47·6
Carbonic Acid	2	44	43·6
Water	1	9	8·8
Crystallised Bicarbonate of Potassa	1	101	100·0

LIQUOR POTASSÆ EFFERVESCENS.

℞ Potassæ Bicarbonatis, drachmam,

Aquæ destillatæ, octarium;

Potassæ bicarbonatem in aquâ liqua; eique acidi carbonici vi compressi immitte plusquam satìs sit ad saturationem. Liquorem in vase benè obturato serva.

EFFERVESCING SOLUTION OF POTASSA.

Take of Bicarbonate of Potassa, a drachm,

Distilled Water, a pint;

Dissolve the bicarbonate of potassa in the water, and pass into it of carbonic acid compressed by force, more than sufficient for saturation. Keep the solution in a well-stopped vessel.

This solution is most conveniently prepared in the apparatus used by the manufacturers of soda water.

LIQUOR POTASSÆ.

℞ Potassæ Carbonatis, uncias quindecim,

Calcis, uncias octo,

Aquæ destillatæ ferventis, congium;

Liqua potassæ carbonatem in aquæ congio dimidio. Calci insperge aquæ pauxillum in vase fictili et resolutâ calce, reliquam aquam adjice. Liquores inter se protinùs commixtos operto vase subindè agita donec refrixerint. Tum sepone ut subsidat calcis carbonas. Denique liquorem supernatantem effusum, in ampullâ vitreâ viridi benè obturatâ, serva.

SOLUTION OF POTASSA.

Take of Carbonate of Potassa, fifteen ounces,

Lime, eight ounces,

Boiling distilled Water, a gallon;

Dissolve the carbonate of potassa in half a gallon of the water. Sprinkle a little of the water upon the lime in an earthen vessel, and the lime being slaked, add the rest of the water. The liquors being immediately mixed together in a close vessel, shake them frequently until they are cold. Then set the mixture by, that the carbonate of lime may subside. Lastly, having poured off the supernatant liquor, keep it in a well-stopped green glass bottle.

NOTA.

POTASSÆ LIQUOR. Hujus pondus specificum est 1·063. Curcumæ colorem fortitèr in fuscum mutat. Acido nitrico diluto addito, vel nullas, vel perpaucas bullulas acidi carbonici emittit. De saturato liquore nihil, aut propemodum nihil, dejicitur adjectâ vel sodæ carbonate, vel barii chlorido, vel argenti nitrate. Quod ex hoc liquore, vel ex quovis potassæ sale in aquâ soluto, per platini chloridum demittitur, subflavum est.

NOTE.

SOLUTION OF POTASSA. Its specific gravity is 1·063. It strongly changes the colour of turmeric to brown. Dilute nitric acid being added, very few or no bubbles of carbonic acid are given out. Scarcely anything should be precipitated from the saturated solution, either by carbonate of soda, chloride of barium, or nitrate of silver. From this solution, or from any salt of potassa dissolved in water, the precipitate thrown down by chloride of platinum is yellowish.

To this *Note* Mr. Phillips subjoins the following *Remarks:*—"Its action upon turmeric evinces the well-known alkaline power of potash. If much carbonic acid be given out on the addition of the nitric, it shows that the lime used in preparing the solution was deficient in quantity or quality. When converted into nitrate of potash by means of nitric acid, if it give a precipitate with carbonate of soda, some earthy or metallic impurity is present; if with chloride of barium, a sulphate; and if with nitrate of silver, a chloride renders the solution impure. The yellow precipitate yielded by chloride of platina is a double chloride of potassium and platina, which distinguishes potash and its salts from soda and its compounds."

In the above process for the preparation of the solution of pure or caustic potassa, the carbonate of potassa is decomposed by the lime, which abstracts the carbonic acid, and forms an insoluble carbonate of lime. The evolved potassa is retained in the solution, which should be clear and colourless. It feels soapy in consequence of its action upon the cuticle; its taste is acrid and caustic; it is apt to act upon flint glass, so that it should be preserved in green glass bottles, which contain no oxide of lead in their composition, and upon which alkaline solutions have little or no action. The *Liquor Potassæ* is the *Lixivium Saponarium,* and *Aqua Kali puri*, of former Pharmacopœiæ.

POTASSÆ HYDRAS.	HYDRATE OF POTASSA.
℞ Liquoris Potassæ, congium; Aquam in vase ferreo nitido ad ignem consume, donec, ebullitione finitâ, potassæ hydras liquefiat; hanc in formas idoneas effunde.	Take of Solution of Potassa, a gallon; Evaporate the water in a clean iron vessel over the fire, until, the ebullition having ceased, the hydrate of potassa liquefies; pour this into proper moulds.
NOTA.	NOTE.
POTASSÆ HYDRAS. In aperto vase promptè liquescit. In alcohole tota solvitur. Cætera superiori respondent.	HYDRATE OF POTASSA. In an open vessel it readily liquefies. It is entirely dissolved by alcohol. Its other properties are as above.

The composition of this hydrate has been above stated; when perfectly pure, it is white, hard, and brittle; but as it usually occurs it contains oxide of iron and of manganese, silica, and several other impurities. During its solution in water, much heat is produced, and a small quantity of oxygen gas is generally given off from it, in consequence of the presence of peroxide of potassium. It is generally cast into sticks, and is only employed externally.

POTASSA CUM CALCE.	POTASSA WITH LIME.
℞ Potassæ Hydratis, Calcis, singulorum unciam; Tere simul, et in vase benè obturato serva.	Take of Hydrate of Potassa, Lime, each, an ounce; Rub them together, and keep them in a well-stopped vessel.

In the Note upon this preparation, which is only used as an external caustic application, it is stated that it should not effervesce upon the addition of acids, and that it is only partially soluble in alcohol.

The preceding formulæ of the Pharmacopœia include all those preparations of potassium which are of an alkaline character, and which, therefore, as therapeutic agents, admit, in reference to their internal use, of one general definition and description.

The indications which the alkalis are calculated to fulfil, are various and important; and, under the heads of *Ammonia*, *Lime*, and *Magnesia*, are already partly before the reader. Potassa and its carbonates admit of many applications which are common to other alkaline remedies, and more especially to the corresponding preparations of *soda*. In medical practice, they are principally employed as *antacids*, *lithontriptics* and *alteratives*.

In that form of dyspepsia which is attended by excess of acid in the stomach, and which appears to result from disordered gastric secretion, rather than from any change analogous to fermentation suffered by the food itself, the alkalis are valuable remedies; but they are only to be regarded as chemical palliatives, affording temporary relief by neutralizing the free hydrochloric and lactic or acetic acid, which in the cases alluded to is the proximate cause of the symptoms. To effect this, the carbonates are generally preferable to the pure alkalis; but both, when long persevered in, gradually lose their efficacy: their dose, then, requires to be successively increased, and they tend to aggravate the remote cause of the complaint by debilitating the proper or normal powers of the stomach; hence the advantage, and even necessity, of combining alkaline treatment with tonics, and of selecting such alkalis, or, as they may here properly be called, antacids, as are least likely ultimately to debilitate and disagree. The slight inconvenience of the evolution of carbonic acid which follows the use of the carbonated alkalis is amply compensated for by the comparative impunity with which they may be employed; but, when long and carelessly persevered in, they are by no means harmless. In acid dyspepsia the state of the urine must be especially watched, and, when its acidity is so far diminished that it begins to assume an opposite character, alkalis must be avoided; if persevered in, the protecting secretions of the urinary passages are directly or indirectly affected, and emaciation and local and general debility ensue.

The dose of the *Liquor Potassæ*, as an antacid, is from five to thirty minims, twice or thrice a day, in conjunction with mild bitter tonics. Dinner is the meal after which dyspeptic acidity is generally most inconveniently prevalent, and the alkaline remedy should be taken about an hour before, and repeated at bed-time. But in all these cases, little permanent relief is attainable without abstemiousness, regular hours, and proper selection of food; and when medicines of the description we are now considering are resorted to, as they often are, to enable the patient to indulge his palate with impunity, they are mischievous palliatives.

Carbonate of potassa is nauseous, and seldom prescribed; but the bicarbonate, in proper doses, has the advantage of comparative tastelessness, and is very effective, especially when the temporary flatulency arising from the evolution of its carbonic acid in the stomach is not objected to. From ten to thirty grains of this salt may be taken twice or three times a day, with the proper adjuncts. Where there are any reasons for the preference, the *Liquor Potassæ effervescens* may be resorted to.

As a lithontriptic, potassa and its carbonates are used where the lithic or uric diathesis prevails; that is, where the urine is morbidly acid, and deposits uric sediment; in those cases it may be given either in some common diluent, or in almond emulsion, and, if necessary, conjoined with proper diuretics; but a distinction must be made between those cases in which uric sand and uric deposits have become habitual, and those which are merely accidental and occasional; also, between uric deposits and those morbid states of the urine in which a pink (erythric) sediment of a different character makes its appearance, indicative of some chronic visceral disease, or consequent upon what is called a broken constitution. In these latter cases, alkalis, except in small doses, and combined with a tonic and alterative treatment, are in general hurtful. Lastly, in respect to the influence of alkalis upon the urine, their tendency so far to diminish its naturally acid state, as to lead to phosphatic precipitates, must not be forgotten; and where these appear, or where the tendency to red sediment is not decidedly diminished, they must be discontinued as prejudicial.

As an alterative, potassa is frequently given in scrofulous enlargements of the glands, in gouty enlargements of the joints, and in some cutaneous disorders, especially those which are connected with acidity of the primæ viæ.

The subjoined are some of the common alkaline formulæ, applicable to the above cases; but the vehicles and adjuncts both admit of infinite variation. First, as *antacids*:—

℞ Liquoris Potassæ, ♏x.
Infusi Cascarillæ, fʒx.
Tincturæ Cardam. comp.
Syrupi Aurant. āā fʒss.
M.

℞ Potassæ Bicarbonatis, ℈j.
Infusi Lupuli, fʒx.
Spiritus Ammoniæ compos. ♏xv.
M.

Secondly, as *lithontriptics*:—

℞ Liquoris Potassæ Carbon. fʒss.
Misturæ Amygdalæ, f℥iss.
Tincturæ Hyoscyami, fʒss.
M.

℞ Liquoris Potassæ, ♏xv.
Decoct. Hordei compos. f℥iss.
Tinct. Opii, ♏v.

Thirdly, as *alterative* and *diuretic*:—

℞ Liquoris Potassæ, ♏x.
Decoct. Sarzæ, f℥ij.
M.

℞ Liquoris Potassæ, ♏xv.
Decoct. Scoparii compos. f℥iss.
Spiritus Juniper comp. fʒj.
M.

Other formulæ and uses of the bicarbonate and carbonate of potassa are adverted to under the head of CARBONIC ACID (p. 153).

As an external application, the *Potassæ hydras* (*Potassa fusa*) has long been employed as a powerful escharotic; it dissolves and combines with the cutis and forms a slough and ulcer, but the difficulty of limiting its action is such, that it is rarely employed, and the usual contrivances for preventing its spreading are not effectual. In deep-seated inflammation, and in diseases of the hip-joint and spine, issues are sometimes formed by its action; buboes in the groin are occasionally laid open by it, but the lancet is a preferable instrument for such purposes. It has been recommended for the removal of strictures in the urethra, but the difficulty of applying it, and its extreme deliquescent and spreading tendency, must at all events render it inconvenient if not dangerous for such purposes.

It is stated that the *Potassa cum Calce* is a more manageable escharotic, and less deliquescent, than the preceding; it is also, however, less active, and is a clumsy caustic.

A dilute solution of hydrate of potassa is sometimes employed as a detergent and stimulating lotion, and resorted to as a preventive of venereal infection. Two drachms of solution of potassa to four or six ounces of rose-water, with the addition of a little spirit of wine, forms a wash which is frequently employed for cleansing the hair; it removes scurf, and becomes slightly saponified, but unless very dilute, and well washed out with warm water, it injures the appearance of the hair, and is said to have occasioned baldness.

Caustic potassa and its carbonate are placed, by toxicological writers, amongst the *irritant poisons*. Orfila found that five grains of caustic potassa, injected into the blood, killed a dog in five minutes. Thirty-two grains, administered by the stomach, caused vomiting, great pain and restlessness, and death on the third day. On dissection, the œsophagus and stomach were much discoloured, and there was a perforation near the pylorus, surrounded by a hard elevated margin. According to Bretonneau (*see* CHRISTISON, *cap*. VII. *sec*. 2), when potassa to the amount of forty grains is swallowed by dogs, the action of the poison is chiefly confined to the gullet, which becomes ulcerated and corroded, and the animals die of debility and wasting. But when, on the other hand, the potassa was introduced at once into the stomach, larger doses did not prove fatal; symptoms of violent irritation prevailed for two or three days, after which the animals recovered. The stomach, however, in these cases, had been severely injured; for, on strangling some of the animals several weeks afterwards, the villous coat was extensively removed, and even the muscular and peritonæal coats here and there destroyed and cicatrized. Bretonneau states that ten or fifteen grains introduced into the rectum, caused death sooner than three times as much given by the mouth.

Carbonate of potassa resembles the caustic alkali in its general effects upon dogs, but is less active.

Dr. Christison states that he has not been able to find any case of poisoning, in the human subject, with the caustic alkalis, but that the effects of their carbonates have been several times witnessed, and appear closely to resemble those of the concentrated mineral acids. The symptoms are acrid taste, and destruction of the membranes of the mouth, burning and constriction of the throat and gullet; vomiting, and acute pain and tenderness of the abdomen, cold sweats, hiccup, and tremors, and afterwards violent colic and purging of bloody matter with membranous flakes. In a case quoted by Dr. Christison, of a boy who swallowed by mistake three ounces of a strong solution of carbonate of potassa, it proved fatal in twelve hours. In another case, an ounce of carbonate of potassa produced symptoms resembling those of acute gastritis, but the man recovered.

Dr. Christison, however, remarks that a more common form than the preceding is one similar to the chronic form of poisoning with the mineral acids, " in which constant vomiting of food and drink, incessant discharge of fluid sanguinolent stools, difficulty of swallowing, burning pain from the mouth to the anus, and rapid emaciation, continue for weeks, or even months, before the patient's strength is exhausted; and where death is evidently owing to starvation, the alimentary canal being no longer capable of assimilating food." Illustrative cases are referred to in the *Med. Rep.* (vol. III. p. 118), in the *Edin. Med. and Surg. Journ.* (vol. XXX. p. 310), and in Sir Charles Bell's *Surgical Observations* (part I. p. 82). In all these cases the inner coat of the stomach was corroded, and there was ulceration of that viscus.

Of the antidotes to poisoning by the alkalis, the diluted acids naturally suggest themselves, and of these, diluted acetic acid would probably be selected; it would, however, appear that almond, or olive oil, are preferable, but they require to be given in repeated and very large doses.

We may now proceed to the remaining compounds of potassium, with the exception of those which for obvious reasons have been elsewhere considered; such, for instance, as the *bromide* and the *iodide* of potassium, and the *compound solution* of the latter, which have been included under the heads of BROMINE and IODINE (see pages 126 and 317).

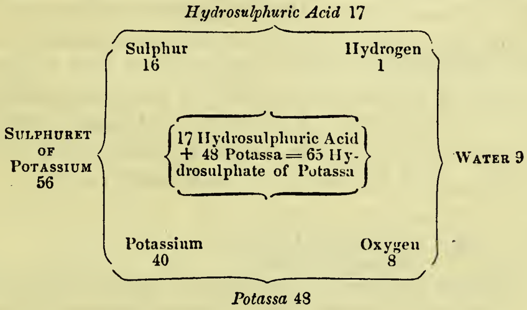
POTASSII SULPHURETUM.	SULPHURET OF POTASSIUM.
℞ Sulphuris, unciam, Potassæ Carbonatis, uncias quatuor; Tere simul, et crucibulo clauso super ignem impone, donec coïerint.	Take of Sulphur, an ounce, Carbonate of Potassa, four ounces; Rub them together, and place them upon the fire in a covered crucible until they have united.
NOTA.	NOTE.
POTASSII SULPHURETUM. Recèns fractum exhibet colorem fusco-flavum. Aquâ vel acido ferè quolibet liquatum acidi hydrosulphurici odorem spirat. Aquâ liquatum flavet. Quod plumbi acetate dejicitur, primum rubet, deinde nigrescit.	SULPHURET OF POTASSIUM. Recently broken, it exhibits a brown-yellow colour. Dissolved in water, or in almost any acid, it exhales the odour of hydrosulphuric acid. When added to solution of acetate of lead the precipitate is at first red, and afterwards becomes black.

The result of the above process is not merely sulphuret of potassium, but a fused mixture of sulphuret of potassium and sulphate of potassa. When sulphur is heated with carbonate of potassa, the carbonic acid is expelled, and the sulphur then acts upon the potassa so as to produce a sulphuret and a sulphate. If we thus suppose 4 equivalents of potassa (48 × 4) to be acted upon by 4 of sulphur (16 × 4), 1 equivalent of the sulphur (16) will abstract 3 equivalents of oxygen (8 × 3) from 3 of the potassa, to form 1 of sulphuric acid (40), which, uniting with 1 of potassa (48), will form 1 of sulphate of potassa (40 + 48 = 88): and the 3 equivalents of potassium (40 × 3) will then unite with the remaining 3 of sulphur (16 × 3) to form 3 of sulphuret of potassium. So that, according to this statement, the product of the above formula is composed of—

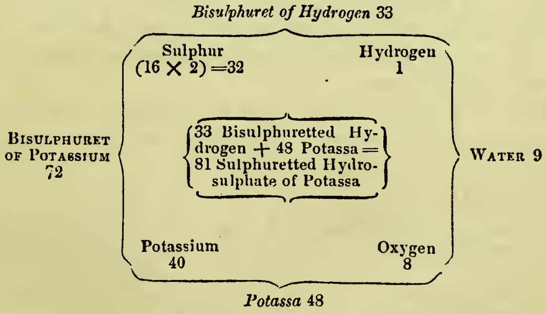
	Atoms.	Equivalents.	Per Cent.
Sulphate of Potassa	1	88	34·3
Sulphuret of Potassium	3	168	65·7
Potassii Sulphuretum (*Lond. Pharm.*)	1	256	100·0

The mutual action of *sulphur and potassium*, and of *sulphur and potassa*, and the changes consequent upon the action of the sulphurets of potassium upon water, will be more evident from the following details:

When 40 parts of potassium are heated with 16 of sulphur, 56 parts of *sulphuret of potassium* are obtained, which, when put into water, furnishes, as shown in the following diagram, 65 parts of hydrosulphate of potassa; that is, the water transfers 1 atom of hydrogen to 1 of sulphur, to produce hydrosulphuric acid; and 1 of oxygen to 1 of potassium, to produce potassa.


Hydrosulphuric Acid 17
Sulphur 16
Hydrogen 1
SULPHURET OF POTASSIUM 56
17 Hydrosulphuric Acid + 48 Potassa = 65 Hydrosulphate of Potassa
WATER 9
Potassium 40
Oxygen 8
Potassa 48

When 1 atom of potassium (= 40) is heated with 2 of sulphur (= 32) a *bisulphuret of potassium* is formed, which resists a red heat without decomposition. The same compound is obtained whenever excess of sulphur is heated to redness with potassium. When put into water, it yields a solution of *sulphuretted hydrosulphate of potassa*, or of a compound of potassa with bisulphuretted hydrogen; for only 1 atom of water is decomposed by it, and 1 atom of potassa formed: the 1 atom of hydrogen uniting with two of sulphur (1 + 16 × 2) to form 1 of *bisulphuretted hydrogen*, represented by the equivalent number 33. These changes are shown in the following diagram:—


Bisulphuret of Hydrogen 33
Sulphur (16 × 2) = 32
Hydrogen 1
BISULPHURET OF POTASSIUM 72
33 Bisulphuretted Hydrogen + 48 Potassa = 81 Sulphuretted Hydrosulphate of Potassa
WATER 9
Potassium 40
Oxygen 8
Potassa 48

Sulphuret of potassium is also formed by the action of hydrogen, or of charcoal, at a red heat, upon sulphate of potassa; in which case the oxygen both of the sulphuric acid and of the potassa is carried off, either in union with the hydrogen or the carbon, and 1 atom of sulphur and 1 of potassium remain in combination.

When the solution of hydrosulphate of potassa is decomposed by an acid, hydrosulphuric acid gas is evolved, and there is no deposition of sulphur. But when acids are added to the solution of sulphuretted hydrosulphate of potassa, either sulphur or bisulphuret of hydrogen are deposited. If a *strong* solution of the sulphuretted hydrosulphate be poured into hydrochloric acid, a viscid substance falls, which is *bisulphuret of hydrogen:* but if hydrochloric acid be dropped into a *weak* solution, hydrosulphuric acid is evolved, and sulphur precipitated.

The *Potassii Sulphuretum* of the Pharmacopœia is of a dirty yellow colour, inclining to green, a sulphureous smell, and a nauseous alkaline and bitter taste. Its usefulness is doubtful, either as an internal or external remedy. It has been classed with expectorants, diaphoretics, and alteratives, and has been prescribed in doses of from two to five grains in pulmonary affections, in rheumatism, and in cutaneous disorders, united with soap, in the form of pill. Perhaps the only cases which justify its use are certain obstinate cutaneous eruptions, where other remedies have been tried in vain. The following are the formulæ:—

℞ Potassii Sulphureti,
Saponis, āā ʒss.
Divide in pilulas xxiv. quarum capiat unam quartâ quâque horâ, superbibendo cyathum decocti sarsaparillæ compositi.

The following lotion has been recommended in *tinea capitis:*—

℞ Potassii Sulphureti, ʒiij.
Saponis duri, ʒij. Solve in
Aquæ Rosæ, f℥ij.
Spiritus Rectificati, f℥j.
Fiat lotio quâ irrorantur maculæ impetiginosæ, mane et vesperi.

An ointment of sulphuret of potassa, containing about half a drachm of the sulphuret, triturated with an ounce of lard, has been used in the cure of the itch: it appears, however, to possess no advantage over other less disagreeable applications.

As an antidote to poisons, sulphuret of potassa is properly laid aside; there is no case in which it can be judiciously administered.

POTASSÆ SULPHAS.	SULPHATE OF POTASSA.
℞ Salis qui restat post destillationem Acidi Nitrici, libras duas,	Take of the Salt which remains after the distillation of Nitric Acid, two pounds,
Aquæ ferventis, congios duos;	Boiling Water, two gallons;
Salem in crucibulo ure donec acidum sulphuricum supervacaneum penitùs expulsum fuerit, tum in aquæ congiis duobus coque donec pellicula supernatet et, liquore colato, sepone ut fiant crystalli. Has, effuso liquore, exsicca.	Ignite the salt in a crucible till the excess of sulphuric acid is entirely expelled, then boil it in the two gallons of water until a pellicle floats, and having strained the liquor, set it aside that crystals may form. Having poured off the liquor, dry them.

NOTA.

POTASSÆ SULPHAS (*crystalli*). In alcohole nihil, in aquâ destillatâ paululùm liquatur. Quod ex hoc liquore a platini chlorido demittitur, subflavum est; quodque a barii chlorido, albet. Id in acido nitrico dissolvi non potest.

NOTE.

SULPHATE OF POTASSA (*crystals*). Insoluble in alcohol, and slightly soluble in distilled water. What is thrown down from this solution by chloride of platinum is yellowish, and by chloride of barium white, and insoluble in nitric acid.

The salt which remains after the distillation of nitric acid is bisulphate of potassa; when heated, its excess of acid is expelled, and the dry neutral sulphate remains, composed of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	54·5
Sulphuric Acid	1	40	45·5
Sulphate of Potassa	1	88	100·0

The crystalline forms of this salt result from a primary right-rhombic prism, variously modified, and frequently forming bi-pyramidal hexagonal prisms. It requires sixteen parts of cold, and five of boiling water for solution; its taste is saline and bitterish; it is insoluble in alcohol. It forms a useful aperient, especially for children, in conjunction with rhubarb. Fifteen grains, with five of rhubarb, may be given to children of from four to six years of age, as an effectual though gentle means of cleansing the bowels. In the dose of about two drachms it is aperient, but its difficult solubility is against its general use. It has been occasionally administered in pills, especially in cases of habitual constipation, conjoined with small doses of aloes.

POTASSÆ BISULPHAS.

℞ Salis qui restat post destillationem Acidi Nitrici, libras duas,
Acidi Sulphurici, libram,
Aquæ ferventis, octarios sex;

Salem in aquâ liqua, eique adjice acidum et misce. Dein decoque, et sepone, ut fiant crystalli.

BISULPHATE OF POTASSA.

Take of the Salt which remains after the distillation of Nitric Acid, two pounds,
Sulphuric Acid, a pound,
Boiling Water, six pints;

Dissolve the salt in the water, and add to it the acid, and mix them; lastly, boil down the solution, and set it aside that crystals may form.

The bisulphate of potassa remaining after the distillation of nitric acid generally contains sesquisulphate, and some sulphate of potassa, so that, to ensure the production of a perfect bisulphate, the Pharmacopœia directs the addition of sulphuric acid, and crystallisation, as above.

Bisulphate of potassa forms tabular crystals, which appear to be the secondaries of an octoëdron, with a rhombic base: they consist of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	32·87
Sulphuric Acid	2	80	54·80
Water	2	18	12·33
Crystallised Bisulphate of Potassa	1	146	100·00

This salt is very sour, and soluble, one part requiring only two of water at 40°, and less than an equal weight at 212°, for solution. It is insoluble in alcohol. Exposed to a red heat it loses its excess of acid, and is reduced to the state of neutral sulphate. It is scarcely ever used, for it generally gripes, and is not much more active than the sulphate. Where a sour saline remedy of this kind is required, it is easily formed by the addition of dilute sulphuric acid to sulphate of potassa.

POTASSÆ NITRAS. *Nitrate of Potassa.*

NOTA.	NOTE.
POTASSÆ NITRAS (*crystalli*). In aquâ destillatâ omnis liquatur. Ex hoc liquore nihil, neque barii chloridum, neque argenti nitras demittit. Calore liquescit, et igne acri oxygenium edit. Ex hoc sale in pulverem trito, acidum sulphuricum vapores nitricos elicit.	NITRATE OF POTASSA (*in crystals*). It is totally dissolved by distilled water. Nothing is thrown down from this solution, either by chloride of barium or nitrate of silver. It liquefies by heat, and in a strong fire it yields oxygen. From this salt, rubbed into powder, sulphuric acid elicits nitric vapours.

Nitrate of Potassa, Nitre, or *Saltpetre* (*Sal petræ*) is exclusively supplied from our Indian territories. It is imported from Bengal mostly in an impure state, and refined in this country, by solution and crystallisation. It is an article of much consumption as an ingredient in gunpowder; it is also largely employed as a source of nitric acid, and for other purposes in the arts. It crystallises in six-sided prisms, terminated by a dihedral summit; its primary form being a right rhombic prism. The crystals are anhydrous; their taste is cooling and peculiar, and they are soluble in about six parts of cold water, and in their own weight of water at 212°; but authorities differ much respecting the solubility of this salt, probably in consequence of its varying extremely with the temperature. During its solution, it produces considerable cold; thus, one part of nitre in fine powder rapidly dissolved in five parts of water, depresses its temperature from 50° to 35°. It is insoluble in absolute alcohol. When heated to about 600° it fuses without undergoing decomposition, and concretes, on cooling, into a white striated mass, formerly called *sal prunella*, from the circumstances of its having formerly been cast into small balls, and stained of a plum-colour. At a red heat it is slowly decomposed, evolving abundance of oxygen gas, mixed with nitrogen. During this decomposition, a hyponitrite of potassa, and compounds of nitric and nitrous oxides with potassa, are formed. When nitre is heated with combustible substances, it acts as a powerfully oxidizing agent; mixed with charcoal, and deflagrated by throwing the mixture into a red-hot crucible, it yields carbonate of potassa; with phosphorus, phosphate of potassa; and with sulphur, a mixture of sulphite and sulphate of potassa. Gunpowder is an intimate mixture of about 77 parts of nitre, 12 of charcoal, and 10 of sulphur. Nitre is composed of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	47·1
Nitric Acid	1	54	52·9
Nitrate of Potassa	1	102	100·0

Nitre is diuretic, refrigerant, and sedative; when given in small doses, it diminishes arterial action, and is therefore used as a sedative refrigerant in inflammatory complaints, excepting, perhaps, those of the urinary organs: it passes off by the kidneys. The dose of nitre is from five to twenty grains, in ten or twelve drachms of liquid; the best vehicles are those of a mucilaginous nature, and almond emulsion. If intended as a refrigerant, the draught, as Dr. Paris has observed, should be swallowed immediately after the salt has been dissolved; in such cases it may be directed as follows:—

℞ Potassæ Nitratis pulver. grana viij.
Pulver. Tragacanth. compos. ʒss.
M. fiat pulvis quartis horis ex aquæ frigidæ cochlear. iij. sumendus.

In inflammatory cases, nitre may be combined with diaphoretics, such as saline draughts, or mixtures containing tartarised antimony:—

℞ Potassæ Carbonatis, ℈j.
Succi Limonum recentis, f℥ss.
Misturæ Camphoræ, f℥j.
Potassæ Nitratis, gr. x.
Syrupi Rhæados, fʒj.
M. fiat haustus quartâ quâque horâ sumendus.

℞ Liquoris Ammoniæ Acetatis,
Aquæ Menthæ Viridis, āā f℥ij.
Aquæ destillatæ, f℥iiiss.
Potassæ Nitratis, ʒss.
Vini Antimonii Potassio-tartratis, f℥ss.
Fiat mistura cujus sit dosis cochlearia tria ampla tertiâ vel quartâ quâque horâ.

When nitre produces spasm in the stomach, it should, in most cases, be discontinued.

Nitre is a good addition to gargles for inflammatory sore throat:—

℞ Potassæ Nitratis, ʒiss.
Mellis Despumat. f℥ij.
Aquæ Rosæ, f℥vj.
M. fiat gargarisma.

Or,—

℞ Potassæ Nitratis, ʒij.
Decocti Hordei, f℥vij.
Oxymellis Simplicis, f℥j.
M.

The cold produced by the solution of powdered nitre in water, is increased by the addition of sal ammoniac; such a solution may sometimes prove useful as a refrigerant lotion, more especially where ice cannot be procured. For this purpose, one part of a mixture of equal weights of powdered nitre and sal ammoniac may be dissolved in ten or twelve parts of the coldest water that can be obtained.

Cases of poisoning by nitre are not unfrequent, in consequence of its resemblance to sulphate of soda, or Glauber's salt; and of the baneful custom which prevails, in some shops, of keeping these salts in neighbouring drawers. The effects of nitrate of potassa seem to be partly those of an irritant, and partly of a narcotic poison. Orfila found that, in the dose of one drachm, it killed dogs, when the gullet was tied, in twenty-nine hours; and in the dose of an ounce and a-half, in ninety minutes. It produced giddiness, convulsions, dilated pupil, insensibility, and palsy. After death, the stomach was livid externally, and reddish-black internally, and the heart filled with florid blood. When the precaution of tying the gullet had not been taken, the animals recovered in about twenty-four hours, in consequence of vomiting. Applied to a wound, the salt only excites violent inflammation.

The effects of over-doses of nitre on man are variable. Dr. Alexander took an ounce and a half, largely diluted, in the course of twenty-four hours, without ill effect; and, occasionally, where an ounce or more has been swallowed by mistaking it for sulphate of soda, it has been ejected by vomiting, without much ill effect. But dangerous, and even fatal consequences, are not uncommon, such as great pain of the abdomen, bloody stools and vomiting, dysentery, nervous affections, such as chorea, palsy, and tetanus; such symptoms have sometimes terminated fatally. The appearances after death are those of violent inflammation of the stomach and intestinal canal, detachment of portions of the villous coat of the stomach, and red and black spots.

The treatment in these cases consists in promoting vomiting, in the use of mucilaginous drinks, and the general remedies requisite in counteracting the effects of irritant and corrosive poisons.

POTASSÆ CHLORAS. *Chlorate of Potassa.*

NOTA.	NOTE.
POTASSÆ CHLORAS (*crystalli*). In aquâ destillatâ omnis liquatur. Hic liquor nihil demittit, adjectâ argenti nitrate. Calore liquescit, et si acrius urgeatur calor, oxygenium amittit, et in potassii chloridum convertitur. Acidi sulphurici minimis perpaucis in crystallos instillatis, primùm flavescit sal, mox rubet, et chlorinii peroxydum exhalat.	CHLORATE OF POTASSA (*crystals*). Entirely soluble in distilled water. Nothing is thrown down from this solution by nitrate of silver. The salt fuses by heat, and if more strongly heated, loses oxygen, and is converted into chloride of potassium. When a few minims of sulphuric acid are dropped upon the salt, it first becomes yellow, then reddens, and gives off peroxide of chlorine.

This salt is properly placed among the articles of the "Materia Medica," for it is prepared in great perfection and purity by the wholesale manufacturers, and is used in large quantities for making Lucifers, Prometheans, and similar sources of instantaneous light. It is obtained by passing chlorine through a solution of potassa (or its carbonate), and allowing the liquid to remain for some hours in a cool place (see *Manual of Chemistry*, chap. VI., sec. 1.). During this process, the chlorine decomposes one part of the potassa, and combines with its oxygen to form chloric acid, which, by uniting with another part of the potassa, forms chlorate of potassa; a portion of the chlorine also combines with the potassium to form chloride of potassium, which being more soluble than the chlorate, remains in solution, whilst the chlorate separates in crystals. Chloric acid consists of 1 atom of chlorine and 5 atoms of oxygen, so that 5 atoms of chloride of potassium are produced for every atom of chloric acid which is formed during this reaction, and the ultimate elements of chlorate of potassa are 1 atom of chlorine, 1 of potassium, and 6 atoms of oxygen, which are arranged in the salt as—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	48·7
Chloric Acid	1	76	61·3
Chlorate of Potassa	1	124	100·0

Chlorate of potassa forms brilliant rhomboidic tabular crystals, of an austere, cooling taste, anhydrous, and requiring about eighteen parts of cold, and three of hot water for their solution. The action of heat upon them is described in the above note; and the non-action on nitrate of silver shows that they are free from chloride of potassium, for chlorate of silver is a soluble salt. Chlorate of potassa is by far the best source of pure oxygen gas.

As a medicine, this salt is placed, like nitre, among the refrigerants and diuretics; it has sometimes been supposed to act by imparting oxygen to the blood; it has been prescribed by Dr. Stevens in cholera (*On the Blood*, p. 296), but further inquiries are requisite to establish its therapeutic uses. The usual dose is from ten grains to half a drachm. (*See* CHLORIDE OF SODIUM.)

POTASSÆ TARTRAS.	TARTRATE OF POTASSA.
℞ Potassæ Bitartratis contritæ, libras tres, Potassæ Carbonatis, uncias sedecim, vel quantum satis sit, Aquæ ferventis, octarios sex;	Take of Bitartrate of Potassa, powdered, three pounds, Carbonate of Potassa, sixteen ounces, or as much as may be sufficient, Boiling Water, six pints;
Potassæ Carbonatem in aquâ fervente liqua; tum adjice potassæ bitartratem, et coque. Liquorem cola; dein decoque donec pellicula supernatet, et sepone ut fiant crystalli. Has effuso liquore, exsicca; interùmque liquorem consume ut prodeant crystalli.	Dissolve the carbonate of potassa in the boiling water; then add the bitartrate of potassa, and boil. Strain the solution, and boil it down till a pellicle forms upon the surface, and set aside, that crystals may be formed. Having poured off the solution, dry these, and again evaporate that crystals may be produced.
NOTA.	NOTE.
POTASSÆ TARTRAS (*crystalli*). Facilè in aquâ liquatur. Ex hoc liquore, acido ferè quolibet adjecto, potassæ bitartratis crystalli dejiciuntur, quæ plerumque vasi adhærent. Ex eodem liquore, quod aut a barii chlorido, aut a plumbi acetate, demittitur, id ab acido nitrico diluto dissolvitur.	TARTRATE OF POTASSA (*crystals*). Easily soluble in water. From this solution, on the addition of almost any acid, crystals of bitartrate of potassa are thrown down, which mostly adhere to the vessel. Whatever is precipitated from the same solution by chloride of barium, or acetate of lead, is dissolved by dilute nitric acid.

In the above process, the bitartrate of potassa is rendered neutral by the addition of a sufficient quantity of carbonate of potassa, the carbonic acid of which is expelled.

This salt is generally sold in the form of a granular powder, but it ought always to be crystallised, and perfectly neutral, so as to show no alkaline or acid reaction to the tests of turmeric and litmus. Its primary form is a right oblique-angled prism, with cleavages parallel to the lateral planes. It has a bitterish salt taste, and dissolves in about twice its weight of water. It is slightly deliquescent in a moist atmosphere. It is the *Tartarus solubilis* and *tartarisatus* of former Pharmacopœiæ. By a red heat it is decomposed, and converted into carbonate of potassa. It consists of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	42·1
Tartaric Acid	1	66	57·9
Tartrate of Potassa	1	114	100·0

In doses of from two to six drachms, this salt is a good aperient, especially in combination with senna, or rhubarb; it clears the bowels without griping. The following are useful forms of it:—

℞ Infus. Sennæ, fʒx.
Potassæ Tartratis, ʒij.
Tinctur. Sennæ, fʒij.
M. fiat haustus aperiens.

℞ Pulv. Rhei, ℈j.
Potassæ Tartratis, ʒj.
Olei Menthæ Pip. gutt. iij.
M. fiat pulvis.

℞ Potassæ Tartratis, ℥j.
Pulveris Rhei, ʒj.
Aquæ Menthæ Piper. f℥vij.
Tincturæ Sennæ,
Syrupi Zingiberis, āā fʒss.
M. fiat mistur aperiens. Cochlearia tria pro dosi.

℞ Potassæ Tartratis, ʒiss.
Misturæ Amygdalæ, fʒxiv.
Spiritus Myristicæ,
Syrupi Tolutani, āā fʒss.
M.

The last form is a useful, mild aperient, in cases of uric deposits, for the salts of potassa with vegetable acids, have an alkaline reaction upon the urine. Acids cannot be conjoined with tartrate of potassa, as they abstract part of its base, and throw down bitartrate of potassa.

The following is Klein's *Pulvis lenitivus Hypochondriacus:*—

℞ Flavedinis Cort. Aurant.
Rhei Pulver.
Potassæ Tartratis, āā ʒss.
Olei Cajuput. gutt. iij.
M. ft. pulvis pro una dosi.

POTASSÆ BITARTRAS. *Bitartrate of Potassa.*

POTASSÆ BITARTRAS (*crystalli*). Aquâ parcè liquatur. Lacmum colore rubro inficit. Igne rubente in carbonatem potassæ mutatur.	BITARTRATE OF POTASSA (*crystals*). It is sparingly soluble in water. It reddens the colour of litmus. By a red heat it is converted into carbonate of potassa.

Tartar, as originally deposited in wine casks, is of a brownish-red colour, and is purified by dissolving it in boiling water, and adding albumen and wood ashes; the former coagulates, floats, and entangles various impurities, whilst the latter occasions an effervescence, throwing these up to the surface, whence they are removed by repeated skimmings. Sometimes aluminous earth is used to precipitate the colouring matter, and sometimes the colour is destroyed by well-burnt charcoal.

Bitartrate of potassa is a brittle white salt, the primary form of which is a right-rhombic prism. It tastes sour and gritty, and requires sixty parts of cold, and fifteen of boiling water for its solution. When heated in the open fire, it becomes converted into carbonate of potassa (hence called *Salt of Tartar*). It generally contains traces of tartrate of lime. The crystals of tartar contain—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	25·3
Tartaric Acid	2	132	70·0
Water	1	9	4·7
Bitartrate of Potassa	1	189	100·00

In the dose of a drachm, repeated twice or thrice a day, bitartrate of potassa proves aperient, but is apt to excite pain and flatulence of the bowels. Conjoined with jalap, it forms an hydragogue and diuretic purgative, already noticed as useful in dropsical affections. A weak solution of tartar, flavoured with sugar and lemon-peel, is the pleasant refrigerant drink generally called *imperial;* the following are the proportions:

℞ Potassæ Bitartratis, ʒss.
Sacchari Purif. ʒiv.
Corticis Limonum recent. ʒss.
Aquæ ferventis, Oiij.
M. et cola quando frigidus sit.

An electuary of tartar and honey is said to be efficacious as a vermifuge.

POTASSÆ ACETAS.	ACETATE OF POTASSA.
℞ Potassæ Carbonatis, libram, Acidi Acetici, fluiduncias viginti sex, Aquæ destillatæ, fluiduncias duodecim;	Take of Carbonate of Potassa, a pound, Acetic Acid, twenty-six fluid ounces, Distilled Water, twelve fluid ounces;
Acido cum aquâ priùs commixto potassæ carbonatem adjice usque ad saturationem, tum cola. Liquorem in balneo arenæ, calore cautè adhibito, consume donec sal exsiccetur.	To the acid, previously mixed with the water, add the carbonate of potassa, to saturation, then filter. Evaporate the solution in a sand-bath, cautiously heated, till the salt becomes dry.
NOTA.	NOTE.
POTASSÆ ACETAS. Et aquâ et alcohole tota liquatur. Hic liquor nec lacmum neque curcumam tingit. Nihil, ex eo, adjecto aut barii chlorido, aut argenti nitrate, demittitur, nisi hujus liquor fortior sit, in quo casu, id, quod demissum est, acido nitrico facilè liquatur. Igne rubente, in potassæ carbonatem tota abit. Acidum sulphuricum adjectum odores aceticos elicit.	ACETATE OF POTASSA. Entirely soluble in water and in alcohol. The solution neither affects litmus nor turmeric. Nothing is precipitated from the aqueous solution either by chloride of barium or nitrate of silver, unless the solution be strong, in which case the precipitate is easily soluble in nitric acid. At a red heat, acetate of potassa is converted into carbonate. By the addition of sulphuric acid, it evolves acetic fumes.

Remarks (by Mr. Phillips). "Its total solubility in water proves the absence of insoluble mechanical admixture, and its solubility in alcohol shows that it contains no sulphate of potash; that the solution produces no change either upon litmus or turmeric, proves that there is no excess either of acid or alkali. If it contain sulphate of potash, sulphate of barytes will be precipitated by chloride of barium; and if chloride of potassium, chloride of silver will be thrown down from the nitrate. From a strong solution, acetate of silver may be precipitated by the nitrate; this redissolves on the addition of dilute nitric acid or water, which the chloride of silver does not. At a red heat the acetic acid is decomposed, its hydrogen is expelled, and its carbon and oxygen, or portions of them, forming carbonic acid, it remains in combination with the potash. Sulphuric acid expels the acetic acid, and sulphate of potash remains."

In the above process, the carbonic acid of the carbonate of potassa is expelled by the acetic acid, and the dry acetate of potassa is obtained by the evaporation of the solution. During the evaporation, however, the salt separates in the form of loosely coherent spongy pellicles, which may be successively removed, and furnish it in a good form for use. Those who prepare it on the large scale, fuse it, and, on cooling, it concretes into a lamellar mass, formerly called *Terra foliata Tartari.*

Acetate of potassa has an acetic odour, and pungent saline flavour; it is very deliquescent, and soluble in about its own weight of water; it is also soluble in alcohol. It consists of—

	Atoms.	Equivalents.	Per Cent.
Potassa	1	48	48·5
Acetic Acid	1	51	51·5
Acetate of Potassa	1	99	100·00

This salt is regarded as a diuretic and diaphoretic aperient. As it is always administered in solution, it might have been left to extemporaneous prescription. Without adjuncts it is not effective as a diuretic; as a diaphoretic it ranks with citrate of potassa. It is given in doses of from twenty to sixty grains, generally dissolved in some of the aromatic distilled waters or bitter infusions, and with diuretic adjuncts, as in the following formula. In doses of four to six drachms it is said to be aperient, but as such is never administered:—

℞ Potassæ Acetatis, ʒss.
Infusi Quassiæ,
Aq. Cinnamomi, āā fʒvj.
Aceti Scillæ,
Spiritûs Ætheris Nitrici, āā fʒss.
M. fiat haustus ter in die capiendus.

POTASSII FERROCYANIDUM. — *Ferrocyanide of Potassium.*

NOTA.	NOTE.
POTASSII FERROCYANIDUM (*crystalli*). Aquâ totum liquatur. E partibus 100, leni calore exhalant 12·6. Curcumæ colorem levitèr mutat. Quod,	FERROCYANIDE OF POTASSIUM (*crystals*). It is entirely dissolved by water. When gently heated, it loses 12·6 per cent. of its weight. It slightly changes

ex præparatis è ferri sesquioxydo, ab eo demittitur, cœruleum est; quodque ex præparatis è zinco, albet. Ubi ustum fuerit, quod superest ab acido hydrochlorico liquatur, atque iterùm ammoniâ adjectâ, demittitur; è partibus 100, ferri sesquioxydi 18·7 redduntur.

the colour of turmeric. Its precipitate, with the preparations (solutions) of sesquioxide of iron, is blue; that with the preparations (solutions) of zinc, white. When burned, its residue is soluble in hydrochloric acid, and again precipitated by the addition of ammonia. 100 parts yield 18·7 of sesquioxide of iron.

The objects of this *Note* are further explained by Mr. Phillips, as follows:—"The 12·6 separated from 100 by a gentle heat, are water. The action upon turmeric paper is probably derived from a little undecomposed potash retained by the water of crystallisation. The blue precipitate occasioned in solutions of sesquioxide of iron, is percyanide of iron, or Prussian blue; the white one formed in solutions of zinc is ferrocyanide of zinc. The 18·7 per cent. of sesquioxide of iron obtained after the action of a red heat, result from the oxydizement of the metallic iron of the ferrocyanide of potassium."

The composition of this salt has already been stated, in reference to its employment as a source of hydrocyanic acid (page 305). It may be obtained by digesting Prussian blue (cyanide of iron) in a solution of potassa, and evaporating the resulting solution till it crystallises; it is, however, usually prepared by calcining a mixture of two parts of carbonate of potassa with five of horn, hoof, or other similar dry animal matter, and a small proportion of iron filings. The mixture, during calcination, is carefully stirred as long as fetid vapours are exhaled; it is then allowed to cool, dissolved in water, filtered, and evaporated so as to yield crystals.

During this operation, the elements of the animal matter furnish cyanogen (see page 213), which, with the potassium and iron, produces the ferrocyanide of potassium. By careful evaporation, it affords magnificent crystals, the primary form of which is an octoëdron. They have a peculiar toughness, and a bitterish saline taste, accompanied by a slight sweetness. They are soluble in about three parts of cold, and one of boiling water; and insoluble in alcohol. The great consumption of this salt is as a source of Prussian blue, and as a means of producing several beautiful colours in calico-printing and dyeing; it is of great use in the laboratory as a test of iron and of copper, and other metals, and is sometimes employed in the preparation of hydrocyanic acid.

As a remedial agent, ferrocyanide of potassium is remarkably inert; it has been given in large doses without any important consequences: it passes off with extraordinary rapidity by the urine, but has not, I believe, been satisfactorily detected in the blood. It seems probable that those who have ascribed active powers to it as a sedative and anodyne, have either not used it pure and alone, or that it has undergone some uncommon decomposition in the stomach. The curious proximate, and ultimate composition, however, of this salt, and the peculiar state of combination in which its elementary iron is held, together with the extreme facility of its transit by the kidneys, and the probability of its giving origin, under particular circumstances, to active hydrocyanic or ferrocyanic compounds in the stomach, are circumstances which render further inquiries respecting its physiological and therapeutic effects desirable.

PRUNA. Prunes. *Drupæ exsiccatæ.* The dried fruit of the *Prunus domesticus.* *Cl.* 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Amygdaleæ.

"The tree which yields this fruit is a native of Asia and Greece, although now naturalised to Europe and to our climate, growing wild in coppices, and flowering in April and May. It rises about fifteen feet in height, with a moderately spreading head. The leaves are pale green, standing on short petioles, which have two glands near the base of the leaf; they are serrated, smooth, and, when young, convoluted, and pubescent underneath; the flowers are large, on short solitary peduncles, with an erect calyx and obovate white petals; the fruit is a superior, berried, oval drupe, swelling a little more on one side, and three-grooved; of a blueish violet-colour on the outside, internally consisting of a yellow, fleshy, sweet pulp, and containing a smooth almond-shaped nut." (*Lond. Disp.*)

Prunes are imported from the Continent and of various qualities; they are mildly laxative, and constitute a part of the *Confectio Sennæ* of the Pharmacopœia.

PRUSSIC ACID, *see* Hydrocyanic Acid.

PTEROCARPUS (*πτερον, a wing, καρπος, fruit*). *Lignum.* Red Saunders. The wood of the *Pterocarpus santalinus.* *Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Leguminosæ.

This lofty tree is a native of the mountains of Coromandel and Ceylon; its leaves are petiolate and ternate, each simple leaf being ovate, blunt, entire, smooth above and hoary beneath; the flowers are in axillary spikes; the calyx brown; the corolla papilionaceous; the filaments yellow; the anthers white and globular; the germen oblong; the style curved, and the stigma obtuse; the pod is flat, and contains one compressed seed.

Red saunders, or sandal wood, is imported in blocks from India; it abounds in red resinous colouring matter, readily extracted by alcohol; it is used occasionally to impart colour to tinctures, but is itself quite inert. The term *Santalin* has been applied by Pelletier to the colouring principle. (*Ann. de Chim. et Phys.* LI. 192.)

PULEGIUM (from *pulex*, a flea, because the odour of its leaves, when burned, is said to destroy fleas). *See* Mentha.

PULVERES. Powders.

The ingredients of the *compound powders* should be of such a nature as to suffer little from long exposure to air; and neither deliquescent, efflorescent, nor volatile. It has been supposed that some substances suffer considerable change in consequence of the facility with which air acts upon them when in a state of powder; and this, not so much in consequence of the evaporation or loss of any volatile ingredient, as by the absorption of oxygen, and the consequent change of some of their more fixed principles, especially the extractive matter; but, although some such change may take place in some powders, there is no evidence of any corresponding diminution of their medicinal virtues.

In the preparation of the officinal compound powders, especially of those which contain ingredients of very different specific gravities, or which consist of inert, combined with very active substances, the utmost attention is required to ensure perfect and equable mixture. For this purpose, such of them as have been passed through a sieve should be afterwards triturated for a sufficient time in a shallow mortar, in such a way as to blend all their parts thoroughly together; after which, they should be shaken as little as possible, for mere agitation often tends to separate their ingredients. These powders should be kept in well-corked bottles, and should not be much exposed to air or light.

The following are the Compound Powders of the present Pharmacopœia:—

Pulvis Aloes Compositus .	Compound Powder of Aloes, *see* Aloes.
Pulvis Antimonii Compositus.	Compound Powder of Antimony, *see* Antimony.
Pulvis Cretæ Compositus . .	Compound Powder of Chalk, *see* Calcium.
Pulvis Cretæ Compositus cum Opio	Compound Powder of Chalk with Opium, *see* Calcium.
Pulvis Jalapæ Compositus .	Compound Powder of Jalap, *see* Jalapa.
Pulvis Ipecacuanhæ Compositus	Compound Powder of Ipecacuanha, *see* Ipecacuanha.
Pulvis Kino Compositus . .	Compound Powder of Kino, *see* Kino.
Pulvis Scammonii Compositus	Compound Powder of Scammony, *see* Scammonium.
Pulvis Tragacanthæ Compositus	Compound Powder of Tragacanth, *see* Tragacantha.

PUNICA GRANATUM, *see* Granatum.

PYRETHRUM (from πυρ, *fire;* from the hot flavour of the root). *Radix.* Pellitory Root. The root of the *Anthemis pyrethrum. Cl.* 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Asteraceæ. (Anacyclus pyrethrum. *Lindley.*)

This plant is a native of Barbary, Arabia, and Syria. "Stems numerous, procumbent, somewhat branched, downy; radical leaves spreading, stalked, smoothish, pinnatifid; the segments pinnated, with linear subulate lobes; cauline leaves sessile. Branches one-headed. Involucral scales lanceolate, acuminate, brown at the edge. Receptacle convex, with oblong-obovate obtuse paleæ. Florets of the ray white. Root fusiform, fleshy, very pungent, and, when fresh, producing a sensation of extreme cold followed by heat. The root is imported from the Levant under the name of 'Pellitory of Spain.' It is brownish externally, and whitish internally. Its taste is acrid, hot, and permanent, depending on a fixed acrid oil deposited in vesicles in the bark; the oil renders this root a powerful rubefacient and stimulant." (*Lindley.*)

The root has been analysed by John and by Gautier, with the following results:—

JOHN.	
Acrid resin, with a trace of volatile oil and camphor	1·7
Bitter extract	11·7
Gum	20·0
Inulin	40·0
Lignin	25·0
Water and loss	1·6
	100

GAUTIER.	
Acrid fixed oil and a trace of volatile oil	5
Extractive	14
Gum	11
Inulin	33
Lignin	35
Trace of muriate of lime, and loss	2
	100

When chewed pyrethrum excites a copious flow of saliva, and is often effective as an ingredient in stimulating gargles, and in cases of relaxed uvula; it is also a valuable palliative in tooth-ache. In paralysis of the muscles of deglutition, from ten grains to a drachm of the powdered root have been given conjoined with other stimulants. The following *Compound Tincture of Pyrethrum* may be applied upon cotton to the affected tooth and gum, for the relief of the tooth-ache:—

℞ Pyrethri Radicis contus. ℥ss.
Camphoræ, ʒiij.
Opii, ʒj.
Olei Caryophyllor. ʒij.
Spirit. Vini rectificat. ℥vj.
M. et digere per dies decem. Cola.

PYROLA (from *pyrus*, the pear tree; because its leaves resemble those of the pear). *See* CHIMAPHILA.

QUASSIA. *Lignum.* The wood of the *Quassia excelsa. Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Simarubaceæ. (Picræna excelsa. *Lindley.*)

This handsome tree is a native of South America and some of the West Indian Islands; it is common on the plains and lower mountains of Jamaica. It has a thin gray bark; the leaves are alternate, and consist of five to eight pairs of leaflets, with a terminal one: the leaflets are elliptical, entire, smooth, and deep-green; the ribs are pink; the flowers are in clusters, small, yellowish-green, with a small calyx; the male flowers nearly resemble the hermaphrodite, except that they have only the rudiments of a style; the fruit is a small black drupe, attached in threes to a round fleshy receptacle; it is not bitter.

Quassia wood is imported in billets from the West Indies. It is said to have been named after *Quassi*, a slave who used it as a secret remedy in the cure of the fevers of Surinam. It has a pure and intense bitter taste, which it readily imparts to water and to proof spirit. The usual form of its administration is the *infusion.* It has the advantage over most other vegetable infusions of not decomposing metallic salts; nor is it blackened by iron; hence it is a good vehicle for a variety of mineral tonics. In some cases of dyspeptic debility, especially that brought on by habitually taking too much wine, the stomach will sometimes be relieved by the following formula:—

℞ Infusi Quassiæ, f℥iss.
Zinci Sulphatis, ¼ gr.
M. fiat haustus bis die sumendus.

An infusion of quassia, sweetened by brown sugar, is an effectual poison for flies, and should be preferred to the more pernicious compounds generally used for that purpose.

The nature of *quassin*, the peculiar bitter principle of this wood, has been very imperfectly ascertained.

The following is the only officinal preparation of quassia directed in the *London Pharmacopœia:*—

Infusum Quassiæ.	Infusion of Quassia.
℞ Quassiæ concisæ, scrupulos duos, Aquæ destillatæ ferventis, octarium;	Take of Quassia, rasped, two scruples, Boiling distilled Water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours in a lightly-covered vessel, and strain.

QUERCUS. *Cortex.* Oak Bark. The bark of the *Quercus pedunculata. Cl.* 21. *Ord.* 6. Monœcia Polyandria. *Nat. Ord.* Corylaceæ.

This indigenous tree has a rough, brown bark; alternate, sessile, lobed leaves; flowers in axillary catkins; the male, pendulous, many-flowered, and yellow; the female, longer, peduncled, and three-flowered; the calyx of the male flower is membranous and bell-shaped; that of the female scaly, hemispherical, entire, and woody; the stamens are ten, longer than the calyx; the germen ovate, crowned with a short cylindrical style, and three stigmas; the fruit, or acorn, is well known. (The name *Quercus*, is from *quero*, I enquire; because divinations were given from oaks by the Druids.)

Oak bark has often been substituted for cinchona in the treatment of febrile diseases, but it has never been found more effectual than other common astringent tonics, and perfectly inadequate to the cure of obstinate intermittents; this inefficacy may be explained by the non-existence of any principle in oak bark corresponding to the salifiable bases of the cinchonæ. It has been prescribed in obstinate diarrhœa, and in alvine hæmorrhages, and is recommended by Dr. Underwood "in the malignant coryza, or *snuffles*, of infants, when in spite of keeping the bowels regular, and the use of cordials, the child becomes weak and pallid."

Oak bark has been used in substance, in the dose of from ten to twenty grains, but it is difficultly reduced to a sufficiently fine powder, so that the infusion or decoction is by far the best form.

Decoctum Quercus.	Decoction of Oak Bark.
℞ Quercûs contusæ, drachmas decem, Aquæ destillatæ, octarios duos;	Take of Oak bark, bruised, ten drachms, Distilled Water, two pints;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

QUINA, *see* Cinchona Cordifolia (page 172.)

REFRIGERANTS. "Substances which directly diminish the force of the circulation and reduce the heat of the body without occasioning any diminution of sensibility or nervous energy." (Paris, *Pharmacologia.*)

RESINA (from ῥέω, *I flow*). The resin of the *Pinus sylvestris.* (*See* Pix Liquida, and Terebinthina.)

This resin is defined in the Materia Medica of the Pharmacopœia as the "*Residuum resinæ liquidæ postquam terebinthinæ oleum destillatum est,*" "The residue of the liquid resin after the oil of turpentine is distilled."

When *common turpentine*, (Terebinthina vulgaris) which exudes from the Scotch fir, (and from other species) is subjected to distillation with water, the *oil of turpentine*, as it is termed, passes over, and the resin remains in the still, forming what is called *common*, or *yellow resin:* and which, when fused and again cooled, becomes brown and transparent, and is called *colophony*, or *fiddler's rosin.* It has the general characters of the resins, namely, it is fusible, inflammable, insoluble in water, and soluble in alcohol; it has little taste or smell, and consists, according to Gay Lussac and Thenard, of

Carbon	75·94
Hydrogen	10·72
Oxygen	13·34
	100·00

By the action of cold rectified spirit, (specific gravity ·833) colophony is separable into two distinct forms of resin: the one soluble in the cold, and the other remaining insoluble. Both these resins combine with salifiable bases, and form distinct compounds which have been examined and described by Unverdorben (*Poggendorfs Annalen*, xi. 47): he terms the former *pinic acid*, and the latter *silvic acid.*

Resin is an ingredient in several plasters and ointments, and in the following formulæ of the Pharmacopœia.

Emplastrum Resinæ.	Plaster of Resin.
℞ Resinæ, libram dimidiam, Emplastri Plumbi, libras tres; Emplastro plumbi, lento igne liquefacto, resinam contritam adjice, et misce.	Take of Resin, half a pound, Plaster of Lead, three pounds; Add the powdered resin to the plaster of lead liquefied by a gentle heat, and mix them.

This is the common *adhesive plaster*, which, when properly spread upon linen, or occasionally upon soft leather, is of such important use in its various surgical applications. In spreading it, care should be taken not to overheat it, by which its adhesiveness is impaired; and that the linen on which it is spread be dry, otherwise it cracks off.

CERATUM RESINÆ.	CERATE OF RESIN.
℞ Resinæ,	Take of Resin,
Ceræ, singularum libram,	Wax, of each a pound,
Olivæ Olei, fluiduncias sedecim;	Olive Oil, sixteen fluid ounces;
Resinam et ceram lento igne simul liquefac; dein oleum adjice, et ceratum adhuc calens per linteum exprime.	Melt the resin and the wax together over a slow fire; then add the oil, and press the cerate whilst yet warm through linen.

This cerate has long been known under the name of *yellow basilicon.* It is employed as a slightly-stimulating application to foul and indolent ulcers.

EMPLASTRUM PICIS.	PLASTER OF PITCH.
℞ Picis Abietinæ, libras duas,	Take of Burgundy Pitch, two pounds,
Abietis Resinæ, libram,	Resin of the Spruce Fir, a pound,
Resinæ,	Resin,
Ceræ, singulorum uncias quatuor,	Wax, of each four ounces,
Myristicæ Olei expressi, unciam,	Expressed Oil of Nutmegs, one ounce,
Olivæ Olei,	Olive Oil,
Aquæ, singulorum fluiduncias duas;	Water, of each two fluid ounces;
Pici, resinæ, et ceræ, simul liquefactis, primùm abietis resinam, dein oleum myristicæ, oleum olivæ, et aquam adjice. Denique omnia misce, et ad idoneam crassitudinem decoque.	Add first the resin of the spruce fir, then the oil of nutmeg, the olive oil, and the water, to the pitch, resin, and wax melted together. Lastly, mix them all, and boil down to a proper consistence.

This is a relic of old pharmacy; it is a stimulant application, and, spread upon soft leather, is sometimes applied to the thorax in pulmonary affections, and to rheumatic joints; like other stimulating plasters, it occasionally creates inconvenient uneasiness upon irritable skins.

RHAMNUS (from ῥαιω, *I annoy;* from its thorns). *Baccæ.* Buckthorn Berries. The berries of the *Rhamnus catharticus. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Rhamnaceæ.

An indigenous shrub, flowering in May, and ripening its berries in October; it has a woody, branched stem; the leaves are ovate, serrated, and in fascicles, on footstalks; the flowers are peduncled, greenish-yellow, four-cleft, and often male and female on different plants: the filaments are short; the anthers round; the germen ovate, with a slender style, and four-cleft stigma; the fruit is a small, black, four-seeded berry.

The juice of the berries is a drastic purge scarcely ever used, except in veterinary practice. It once had repute as promoting watery discharge from the bowels, in cases of dropsy.

The use of the following syrup is limited to horse-balls.

SYRUPUS RHAMNI.	SYRUP OF BUCKTHORN.
℞ Rhamni Succi recentis, octarios quatuor,	Take of the Juice of fresh Buckthorn berries, four pints,
Zingiberis concisæ,	Ginger, sliced,
Pimentæ contritæ, singularum drachmas sex,	Pimenta, bruised, of each six drachms,
Sacchari, libras quatuor;	Sugar, four pounds;

Sepone succum per triduum, ut fæces subsidant, et cola. Succi defæcati octario zingiberem et pimentam adjice; tum macera leni calore per horas quatuor, et cola; quod reliquum est ad mensuram octarii cum semisse decoque; liquores misce; saccharum adjice et liqua.

Set by the juice for three days that its dregs may subside, and strain. To a pint of the clear juice, add the ginger and pimenta; then macerate with a gentle heat for four hours, and strain; boil down that which is left to the measure of a pint and a half; mix the liquors; add the sugar and dissolve it.

RHATANY, *see* KRAMERIA.

RHEUM. *Radix.* Rhubarb. The root of the *Rheum palmatum. Cl.* 9. *Ord.* 3. Enneandria Trigynia. *Nat. Ord.* Polygonaceæ.

It is curious that the species of *rheum* which affords the officinal rhubarb, is still undetermined. Professor Royle is of opinion that the officinal drug is obtained in the heart of Thibet, from some hitherto undescribed species. "The rhubarb of commerce," he says, "is well known to be brought by the Chinese to the Russian frontier town of Kiachta, according to the treaty formed between those powers in 1772. The Chinese obtain the rhubarb produced in China Proper, from that part of the province of Shensee, now called Kansu, situated between North latitude 35° and 40°; but the best, according to the missionaries, who say it is called Tai-hoang, in the province of Letchuen, from the mountains called Sue-khan, or of snow, which extend from North latitude 26° to 33° and from about 100° to 105° of East longitude. That from the latter province probably forms much of what is called China rhubarb; the missionaries met large quantities of it brought down in the months of October and November. That from Kansu may afford some of what is called Russian rhubarb; but both Pallas and Rehman have ascertained that the greater portion, if not the whole of this, is obtained in April and May, from the clefts of rocks, in high and arid mountains surrounding Lake Kokonor. Bell also learned that it was the produce of Mongolia, and Marco Polo of Succuir, in Tanguth. Dr. Rehman ascertained that the trade is in the hands of one Bucharian family, who farm the monopoly from the Chinese government, and reside at Si-ning, a Chinese town on the very frontiers of Thibet, 3000 versts from Kiachta, and twenty days' journey from Kian-sin and Shan-sin, Tangutian towns where the Bucharians go to purchase rhubarb. This would bring the rhubarb country within 95° of East longitude, in 35° of North latitude, that is, in the heart of Thibet." (*Illustrations of the Botany of the Himalaya Mountains*, by PROFESSOR ROYLE, as quoted by DR. LINDLEY.)

Dr. Lindley, in his *Flora Medica*, has described nine species of *rheum*, leaving it, however, still doubtful, from which of them the commercial varieties are obtained.

Three varieties of rhubarb root are known in trade,—namely, Russian Rhubarb, Turkey Rhubarb, and Chinese, or Indian Rhubarb. The two first exactly resemble each other, and are generally extremely select and carefully dried; the latter is stated, upon the authority of

Rehman, to be the produce of the same plant, but dried with less care. It would appear that the quality and appearance of rhubarb is greatly dependant upon the skill with which the process of drying is conducted.

The term *Turkey Rhubarb* is said to be applied to the Tartarian rhubarb carried into Turkey through Natolia, but that the greater part is conveyed to Kiachta, "where it is examined by a Russian apothecary, and sent to Petersburgh. The pieces are roundish, and perforated with a large hole; they are of a yellow or reddish colour on the outside, somewhat soft and friable, and when broken, exhibit many diverging streaks of a beautiful bright-red colour. Agreeably to the contract with Russia, all the rhubarb which is rejected must be burned: and even that which is approved must undergo another cleaning before it is finally packed for St. Petersburgh. At this examination, each piece is struck with a small mallet to detach from it any impurities or decayed parts." (THOMSON's *Lond. Disp.*)

East Indian, or *China Rhubarb*, as it is termed, is purchased at Canton by the agents of the East-India Company; it has a less select character than the former, and though much of it is of a very good quality, it is often largely mixed with decayed and with hard or stony pieces. All rhubarb is dressed, and often cut and coloured for the market, its goodness therefore, can only be accurately judged of by cutting each piece, and examining its interior. It breaks with a hackly fracture, it exhibits a mottled texture with streaks of red and gray, its colour is peculiar, and its taste bitter, astringent, and nauseous, tinging the saliva of a bright brown; its powder is bright yellow, inclining to buff. It cuts easily and is moderately hard: the less select pieces are either woody or spongy, or tinged with streaks of a rusty tinge, or sometimes worm-eaten, and they are very deficient in the peculiar odour and taste of the finer varieties.

Several analyses have been made of rhubarb, but without any satisfactory results as concerns the nature of its active principle; it is generally represented as containing a considerable relative proportion of oxalate of lime, but in the samples which I examined, I could not satisfy myself of the presence of oxalic acid. According to Dr. A. T. Thomson, Russian rhubarb contains more tannin, oxalate of lime, and resin, than the Chinese; the Chinese more extractive and gallic acid than the Russian; he has also given a copious comparative table of the effects of various reagents on the aqueous infusions of the Russian and Indian rhubarb. The soluble matter of good rhubarb amounts to between 60 and 70 per cent.

The following are the preparations of rhubarb directed in the present *London Pharmacopœia*.

INFUSUM RHEI.	INFUSION OF RHUBARB.
℞ Rhei concisi, drachmas tres,	Take of Rhubarb, sliced, three drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas duas, in vase leviter clauso, et cola.	Macerate for two hours in a lightly-covered vessel, and strain.

TINCTURA RHEI COMPOSITA.	COMPOUND TINCTURE OF RHUBARB.
℞ Rhei concisi, uncias duas cum semisse,	Take of Rhubarb, sliced, two ounces and a-half,
Glycyrrhizæ contusæ, drachmas sex,	Liquorice-root, bruised, six drachms,
Zingiberis concisæ,	Ginger, sliced,
Croci, singulorum drachmas tres,	Saffron, of each three drachms,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

EXTRACTUM RHEI.	EXTRACT OF RHUBARB.
℞ Rhei contriti, uncias quindecim,	Take of Rhubarb, powdered, fifteen ounces,
Spiritûs tenuioris, octarium,	Proof Spirit, a pint,
Aquæ destillatæ, octarios septem;	Distilled Water, seven pints;
Macera per quatriduum leni calore, dein cola, et sepone, ut fæces subsidant. Liquorem effunde, eumque defæcatum ad idoneam crassitudinem consume.	Macerate for four days with a gentle heat, then strain, and set by, that the dregs may subside. Pour off the liquor and evaporate it, when strained, to a proper consistence.

PILULÆ RHEI COMPOSITÆ.	COMPOUND RHUBARB PILLS.
℞ Rhei contriti, unciam,	Take of Rhubarb, in powder, an ounce,
Aloës contritæ, drachmas sex,	Aloes, powdered, six drachms,
Myrrhæ contritæ, unciam dimidiam,	Myrrh, powdered, half an ounce,
Saponis, drachmam,	Soap, a drachm,
Carui Olei, fluidrachmam dimidiam,	Oil of Caraway, half a fluidrachm,
Syrupi, quantum satis sit;	Syrup, as much as may be sufficient;
Misce inter se pulveres, tum omnia simul contunde, donec corpus unum sit.	Mix the powders with each other, then pound all together till incorporated.

Rhubarb is an important article of the Materia Medica, and calculated to fulfil several indications. In doses of from fifteen to thirty grains it is aperient, emptying the bowels without griping, and acting afterwards as an astringent; hence its peculiar use in common diarrhœa. It is best given in some aromatic water, or conjoined with a few grains of powdered cinnamon, which covers its nauseous flavour. Combined with other purgatives, it affords a useful series of pharmaceutical compounds. It may be given with saline purges; and especially with sulphate of potassa.

The following is also a good aperient mixture, of which an ounce and a half may be taken in the morning, as a mild cleanser of the bowels:

℞ Pulv. Rhei, ℈ij.
Potassæ Tartratis, ℥i.
Aq. Menthæ Piper. f℥vj.
Tinct. Sennæ,
Syrup. Zingiberis, āā f℥ss.
Misce.

Rhubarb is also an excellent adjunct to calomel.

In doses of from three to six grains, rhubarb acts as a tonic and astringent, and is given as such in a variety of dyspeptic affections. It is conveniently formed into pills, with a little water only; but these pills should not be kept too long, as they may become inert by induration. It also may be combined with bitter extracts, or aromatic oils, or spices, as in the above *Pilulæ Rhei Compositæ.* It is often advisable to conjoin it with carbonate of soda, magnesia, or other antacids: for such combinations, the *Infusion* is a good formula, and the *Compound Tincture* may be used as an adjunct. Half an ounce of the latter, with an ounce and a half of peppermint water, is an effective remedy in spasmodic flatulency.

The *Extract of Rhubarb* is very mild in its operation, and is useful as an adjunct to aperient and alterative pills; as in the following formula:—

℞ Extract. Rhei, ℈j.
Pilulæ Hydrargyri, ℈ss.
Misce, et divide in pilulas viij. Sumantur duæ omni nocte.

Rhubarb speedily passes off by the kidneys, and may frequently, by the aid of an alkali, be detected in the urine within ten minutes after it has been received into the stomach; in the course of an hour or two it disappears, and after a few hours re-appears, a second absorption taking place, according to Sir Everard Home, from the colon.

RHŒAS (from 'ρεω, *I scatter.*) *Petala.* The petals of the Red Poppy. *Papaver Rhœas. Cl.* 13. *Ord.* 1. Polyandria Monogynia. *Nat. Ord.* Papaveraceæ.

This species of poppy, so common in our corn fields, has a slender hairy stem, about a foot high: the leaves are sessile, pinnatifid, serrated, and hairy; the flowers are solitary on slender hairy peduncles; the calyx consists of two ovate, rough, concave leaves, which fall before the petals expand; the petals are four, large, roundish, spreading, scarlet, and sometimes have a black spot at the base; the germen is ovate and smooth, with a convex scalloped stigma, which becomes an urn-shaped capsule.

The petals are only useful as a colouring material, in which capacity they form the basis of the following syrup:

SYRUPUS RHŒADOS.	SYRUP OF RED POPPY.
℞ Rhœados, libram,	Take of Red Poppy petals, a pound,
Aquæ ferventis, octarium,	Boiling Water, a pint,
Sacchari, libras duas cum semisse;	Sugar, two pounds and a-half;
Aquæ, balneo aquoso calefactæ, rhœadem paulatim adjice, subinde movens; tum, vase seposito, macera per horas duodecim; dein liquorem exprime, et postquam fæces subsederint saccharum adjice, et liqua.	Gradually add the poppy petals to the water heated in a water bath, frequently stirring them; then, the vessel being removed, macerate for twelve hours; afterwards press out the liquor, and when the dregs have subsided, add the sugar, and dissolve it.

RICINI OLEUM. Castor Oil. *Oleum e seminibus expressum.* The expressed oil of the seeds of the *Ricinus communis. Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Euphorbiaceæ.

This is a glaucous plant cultivated in India, America, Africa, and Europe; it is said to be a native of Greece. At Parnisus in the Morea, it is called *wild vine*, from its vine-like leaves. "In the Bosphorus it is called *Kroton*, from the resemblance of its seeds to the tick-insect which fastens on dogs' ears." (*Hort.Trans.* VI.) It is extremely variable in size; "when it is cultivated in Great Britain, an annual three or four feet high; in India sometimes becoming a pretty large tree, of many years duration; at least such is Roxburgh's statement. Clusius saw it in Spain with a trunk as large as a man's body, and fifteen to twenty feet high; and Ray found it in Sicily as big as our common alder trees, woody, and long-lived. But Willdenow considers the arborescent kinds, which are more than annual, as distinct species, which he calls *R. viridis*, *Africanus*, *lividus*, and *inermis;* they do not, however, appear to be anything more than mere varieties." (*Lindley.*)

The stem is thick, furrowed, and jointed; leaves large, deeply divided into seven segments, on long, tapering, purplish stalks. Flowers in long green, glaucous spikes, springing from the divisions of the branches, the males from the lower part of the spike, the females from the upper; the capsule is trilocular, covered with rough spines, and bursts elastically to expel the seeds, which are ovate, shining, black, spotted with gray.

The seeds are acrid and drastic, but afford, on expression, a pale, fixed oil, of a nauseous smell and taste, and leaving a very slight sensation of acrimony on the palate. In the West Indies, the oil is sometimes separated by boiling the decorticated seeds in water; in this case it is deeper-coloured, more acrid, and more liable to become rancid; generally, also, more active as a purgative. Some of the oil as it now occurs in the market is absolutely colourless, and has scarcely any taste; it appears to have been decoloured or bleached, and in this state it is often almost inactive; so that the oil which is of a straw colour, and which has both taste and smell, though only in a slight degree, is to be preferred.

Castor oil congeals at about 0°; exposed to air it gradually becomes rancid, and very thick and viscid: it dissolves in absolute alcohol and in ether. Its specific gravity is about ·960. If it form a milky mixture when shaken with its bulk of alcohol, or if any portion remain undissolved it is probably adulterated with some other fixed oil. The complicated products of its destructive distillation have been examined by Bussy and Lecanu. (*Journ. de Pharm.*, XIII., 68.) When heated with a little nitric acid, castor oil is converted into a substance resembling hard butter; it occasionally undergoes an analogous change in the bowels, and is passed in a solid form, and in one case, in indurated nodules, which were at first regarded as biliary concretions.

Castor oil is a valuable aperient; for, in doses of from half an ounce to an ounce, it evacuates the bowels, with little irritation; it is especially useful in inflammatory cases, or where there is spasm, or where increased action of the system is particularly to be avoided. It is, however, very liable to nauseate to a distressing extent, and is often rejected from the stomach; effects which may in some measure be be prevented by giving it in aromatic waters, or with coffee. We should, however, be cautious in giving castor oil in cases of obstructed bowels, where vomiting may prove injurious; in hernia, for instance, or where there is a determination of blood to the head. It may sometimes be administered in the form of an emulsion, rubbed up with mucilage or yolk of egg, though in this way it is generally more nauseous, unless blended with aromatics.

℞ Olei Ricini, f℥vj.
Vitelli Ovi, q. s.
Aquæ Menthæ Piper. f℥x.
M. fiat haustus aperiens.

The oil should be first triturated with the yolk of egg, and the peppermint water gradually added, so as to form an even mixture. About half the yolk of an egg will generally suffice. Half an ounce of castor oil shaken up with double the quantity of water gruel, makes a smooth emulsion, and is not very disagreeable.

ROSA CANINA. *Fructus pulpa.* The pulp of the fruit of the Dog Rose.

ROSA CENTIFOLIA. *Petala.* The petals of the Damask Rose.

ROSA GALLICA. *Petala.* The petals of the Red Rose. *Cl.* 12. *Ord.* 5. Icosandria Polygynia. *Nat. Ord.* Rosaceæ.

These are shrubs with pinnated leaves and showy flowers. The *Rosa canina* is common over the whole of Europe and the North of Asia. The *Rosa centifolia* is found wild in the woods of the eastern parts of the Caucasus. The *Rosa Gallica*, in the hedges and thickets of various parts of Austria and the Crimea.

The pharmaceutical preparations of these species of *Rosa* are elegant but unimportant; they are as follow:—

CONFECTIO ROSÆ CANINÆ.	CONFECTION OF DOG ROSE.
℞ Rosæ Caninæ, libram,	Take of the pulp of the fruit of the Dog Rose, a pound,
Sacchari contriti, uncias viginti;	Sugar, powdered, twenty ounces;
Rosæ pulpam, in vase fictili, leni calori expone; tum saccharum paulatim adjice, et tere simùl, donec corpus unum sit.	Expose the pulp of the rose to a gentle heat in an earthen vessel; then gradually add the sugar, and rub them together till they are thoroughly incorporated.

This confection is employed for the purpose of embodying powders into the form of pills, and as the basis of pectoral electuaries and linctuses, but it soon becomes hard and candied when kept, so that it is scarcely ever found in the apothecaries' shops fit for use. It is commonly known under the name of *Conserve of Hips.*

AQUA ROSÆ.	ROSE WATER.
℞ Rosæ Centifoliæ, libras decem,	Take of the petals of the Damask Rose, ten pounds,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos;	Water, two gallons;
Destillet congius.	Let a gallon distil.

This water is commonly distilled as above directed, from fresh rose-leaves; the flowers should be gathered when in full perfection, in dry weather, and the petals carefully separated from the stalks and calyces; the distillation should be performed slowly, and if a very fragrant water is required, the first product should be returned into the still and half its bulk drawn over, which is a better way of proceeding than that of adding to it another portion of the leaves.

Sometimes rose-leaves are preserved for distillation by being salted; they retain their odour, and the water may then be drawn from them at any convenient period of the season, and equals in fragrancy that from the fresh petals. Rose-water is, however, usually distilled at the time the flowers blow, and is preserved in jars or bottles which should be corked and kept in a cool place; with every precaution it sometimes will become sour, and is very apt to do so if the bottles or vessels in which it is kept in store, are not originally perfectly clean. Spirit of wine ought not to be added to this water; it does not materially tend to its preservation, and confers upon it a stimulating power, which, as it is chiefly used in ophthalmic applications, ought to be avoided.

During the distillation of roses there passes over a considerable portion of concrete oil, smelling of the flower, but not so pleasant, and soon becoming rancid. Genuine *otto of roses* is not, it is said, prepared by distillation, but by putting a quantity of carefully picked rose-leaves into a clean jar or cask, with water just sufficient to cover them; the vessel is then set in the sun for a few days, and in about a week the otto collects in the form of à scum upon the surface, and is removed by a piece of cotton.

Rose-water is generally directed, in preference to simple distilled water, in collyria and lotions containing acetate of lead or sulphate of zinc.

SYRUPUS ROSÆ.

℞ Rosæ centifoliæ exsiccatæ, uncias septem,
Sacchari, libras sex,
Aquæ ferventis, octarios tres;

Macera rosæ petala in aquâ per horas duodecim, et cola. Liquorem colatum balneo aquoso consume ad octarios duos, dein saccharum adjice, et liqua.

SYRUP OF ROSE.

Take of Damask-Rose Petals, dried, seven ounces,
Sugar, six pounds,
Boiling Water, three pints;

Macerate the rose petals in the water for twelve hours, and strain. Evaporate the strained liquor in a water-bath to two pints, then add the sugar, and melt it.

This syrup is neither useful nor elegant: it is stated to be very gently laxative, and was formerly given to infants, mixed with an equal quantity of almond oil, to evacuate the bowels.

CONFECTIO ROSÆ GALLICÆ.

℞ Rosæ Gallicæ, libram,
Sacchari, libras tres;

Rosæ petala in mortario lapideo contunde; tum, adjecto saccharo, iterùm contunde, donec corpus unum sit.

CONFECTION OF RED ROSE.

Take of Red-Rose Petals, a pound,
Sugar, three pounds;

Pound the rose-petals in a stone mortar; then, having added the sugar, again pound them till incorporated.

This is a good confection for the formation of sulphate of quinia or of calomel and other powders into pills, and it does not dry and candy so soon as the confection of dog rose; nor is it liable to mouldiness or fermentation. It is the basis of some elegant pectoral conserves or electuaries, and is sometimes prescribed rubbed up with new milk, and strained, as a nutritive tonic for debilitated convalescents.

In the following formula it is used as an adjunct to cinchona:

℞ Confect. Rosæ Gallicæ, ℥ss.
Tere cum decocti Cinchonæ lancifol. ℥viij. et cola.

℞ Colaturæ, f℥iss.
Acid. Sulphur. dilut. ♏v.
Extract. Cinchonæ, grana v.
Misce, fiat haustus sextâ quâque horâ sumendus.

The chemist may perhaps object to the union of the tannin of the rose with the alkaloid of the bark in the above formula, but it is unimportant.

INFUSUM ROSÆ COMPOSITUM.	COMPOUND INFUSION OF ROSES.
℞ Rosæ Gallicæ exsiccatæ, drachmas tres.	Take of Red-Rose Petals, dried, three drachms,
Acidi Sulphurici diluti, fluidrachmam cum semisse,	Diluted Sulphuric Acid, a fluid-drachm and a-half,
Sacchari, drachmas sex,	Sugar, six drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Rosæ petalis aquam superinfunde in vase vitreo; dein acidum immisce. Macera per horas sex et liquorem cola, denique saccharum adjice.	Pour the water upon the rose petals in a glass vessel; then mix in the acid. Macerate for six hours, and strain the liquor; lastly, add the sugar to it.

This compound infusion is an agreeable acid drink in febrile disorders, and an elegant vehicle for a variety of remedies. It covers the saline bitterness of sulphate of magnesia; it is a good solvent for sulphate of quinia, for, although the astringent matter tends to precipitate the quinia, the excess of acid redissolves the precipitate; bitter tinctures and infusions are not incompatible with it, and it is useful in the composition of gargles containing the acids, nitre, alum, tincture of capsicum, &c. The alkalies and alkaline earths, when the acid is saturated by them, change its red colour to green; alum renders it purple.

All the preparations of the *red rose* should be made with the petals of the bud just before it expands; and in this state they should be carefully dried, so as to preserve their brilliant colour, and should be picked from the stalks and calyces: they should be kept in a dry place, and in a bottle or canister, as they are liable to become mouldy and worm-eaten.

ROSMARINUS. *Cacumina.* The *tops* of the *Rosmarinus officinalis.* *Cl.* 2. *Ord.* 1. Diandria Monogynia. *Nat. Ord.* Labiatæ.

This evergreen plant is a native of the South of Europe; it flowers in our gardens in April and May. Its leaves are sessile, opposite, linear, obtuse, and entire, with the margin turned back, dark green, smooth on the upper side, and of a silvery hue on the under; the flowers are axillary and terminal; the calyx bell-shaped, and two-lipped; the upper lip entire, the under divided into two segments; the corolla is downy, variegated blue and white; the tube longer than the calyx, with the upper lip erect and bifid, and the lower divided into three segments. The stamens are longer than the upper lip, and support an oblong, blue, terminal anther: the style is filiform, and terminated by a simple stigma. The seeds are four, oblong, and lodged in the bottom of the calyx.

Distilled with water or alcohol, the tops impart an agreeable fragrancy. A weak infusion of fresh rosemary leaves furnishes a pleasant and wholesome substitute for tea, and is particularly agreeable to some dyspeptic stomachs and nervous habits. The essential oil is yielded in the proportion of about one drachm from each pound of the fresh herb; it is a fragrant stimulant, and often prescribed in liniments and ointments.

SPIRITUS ROSMARINI.	SPIRIT OF ROSEMARY.
℞ Rosmarini Olei, drachmas duas,	Take of Oil of Rosemary, two drachms,
Spiritûs rectificati, congium,	Rectified Spirit, a gallon,
Aquæ, octarium;	Water, a pint;
Misce; tum lento igne destillet congius.	Mix; then, by a gentle fire, let a gallon distil.

Distillation is here superfluous, for the oil may be at once dissolved in the rectified spirit; the product is a pleasant perfume, and limited to external use, as an addition to lotions and liniments. It is a leading ingredient in Hungary water, and in most of the compounds called vulnerary or arquebusade waters. *Hungary water*, as it is generally sold, is a mixture of the spirits of lavender and rosemary, but the following is the genuine recipe:—

Take of fresh Rosemary, in blossom, four pounds,
Fresh Sage, eight ounces,
Ginger Root, two ounces;
Cut, bruise, and pour upon them twelve pints of rectified spirit, and two pints of water. Distil, with a slow fire, eleven pints.

Eau de Cologne also contains oil of rosemary: there are several formulæ for it; among them the following:—

Take of Alcohol, one pint,
Oil of Bergamot,
Oil of Orange-Peel,
Oil of Rosemary, of each, one drachm,
Bruised Cardamom Seeds, one drachm,
Orange Flower Water, one pint.
Distil (from a water-bath) one pint.

RUBEFACIENTS. Stimulating applications, which irritate and redden the skin, without proceeding to the extent of vesication.

RUMEX (from *Rumex*, a spear, from the shape of its leaves). *Folia.* The leaves of the common sorrel, *Rumex acetosa*. *Cl.* 6. *Ord.* 2. Hexandria Digynia. *Nat. Ord.* Polygonaceæ.

This indigenous perennial is common on banks and in pastures; it flowers in June. Stem one to two feet high, round, striated, and leafy Leaves oblong, ovate, and arrow-shaped; the radical leaves petiolate and obtuse; those of the stem sessile, amplexicaul, and a little rolled back. Flowers diœcious, in branched panicles, and arranged in half whorls; calyx and corolla small; stamens short, bearing large yellow anthers; styles short, with large crimson bearded stigmas. Valves ovate, entire, and graniferous.

Sorrel has a pleasant acidity, and contains binoxalate of potassa; it is an excellent article in some culinary sauces, when skilfully dressed; its medical uses are very doubtful; it is, however, represented as refrigerant and diuretic. The expressed juice of the leaves, diluted with water, or made into whey, affords a useful drink in cases of inflammatory fever; and eating them daily as a salad may prove serviceable in some cutaneous affections.

RUTA (from *ρυω*, *I preserve:* from its medicinal powers). *Folia.* Rue. The leaves of *Ruta graveolens.* *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Rutaceæ.

Rue is a native of the South of Europe: its root sends forth several shrubby stalks, covered with rough gray bark: the leaves consist of double sets of irregular pinnæ of a glaucous colour; the flowers are produced in a branched corymbus, on subdividing peduncles; the calyx divides into four or five pointed leaves; the corolla consists of four or five petals, hollow, dentated at the edges, and yellow. The filaments are yellow, tapering, spreading, and generally lodged in the cavity of the petals; the anthers are yellow and quadrangular; the style short, the stigma simple, and the germen large, oval, green, rough, and marked by four furrows; the seeds are rough, angular, and black.

The nauseous, but strong and penetrating odour of rue, places it among the antihysterics, and it is described as antispasmodic and emmenagogue, but it is of uncertain and unimportant efficacy. According to Cartheuser, 320 pounds of rue afford one pound of essential oil.

Confectio Rutæ.	Confection of Rue.
℞ Rutæ exsiccatæ,	Take of Rue, dried,
Carui,	Caraways,
Lauri Baccarum, singulorum unciam cum semisse,	Bay-berries, of each, an ounce and a half,
Sagapeni, unciam dimidiam,	Sagapenum, half an ounce,
Piperis nigri, drachmas duas,	Black Pepper, two drachms,
Mellis, uncias sedecim;	Honey, sixteen ounces;
Arida simul in pulverem subtilissimum tere et conserva. Tum quotiès confectione utendum est, his adjice mel, et omnia misce.	Rub the dry ingredients together into a very fine powder, and keep them. Then, whenever the confection is to be used, add to them the honey, and mix them all.

This is the old *Electuarium e Baccis Lauri.* It is only used in the form of enema, for which, from half a drachm to a drachm is dissolved in half a pint of gruel, and administered in cases of flatulent colic, and occasionally in some of the convulsive affections of infants.

SABADILLA (or *Cevadilla;* from *Ceveda*, a Spanish word). *Semina.* The seeds of the *Helonias officinalis. Cl.* 23. *Ord.* 1. Polygamia Monœcia. *Nat. Ord.* Melanthaceæ.

This plant is a native of Mexico. I take the following description and remarks from Dr. Lindley (*Flora Medica*). "Bulbous. Plants generally cæspitose. Leaves linear, tapering to a point, even, smooth, entire, channelled above, carinate at the back, about four feet long, lax; scape naked, the height of a man, quite simple, terminated by a raceme a foot and a-half long. Perianth deeply six-parted, spreading, yellowish-white, permanent, with linear thick obtuse segments, three of which are rather broader than the others. Filaments six, somewhat clavate, yellowish, inserted into the base of the perianth; those opposite its broadest segments longer than the others, and all longer than the perianth; anthers rather large, yellow, cordate, obtuse. Ovary formed of three cells, united by their sutures. Fruit three-capsular; the carpels united by their suture, but separable. Lower flowers hermaphrodite and fertile; upper, male, and sterile. Smell of flowers, like that of *Berberis vulgaris.*" (SCHIEDE.) This was ascertained by Messrs. Schiede and Deppe to produce at least part of the *Sabadilla-seeds* of the shops, the use of which has become so general for the manufacture of veratria. Their taste is bitter, acrid, and permanent. As there are possibly several allied species producing seeds of the same quality, I have preferred quoting the words of Dr. Schiede, to describing the plant from what I believe to be specimens of it in my possession. It is certainly not a *Veratrum*, to which Schiede and Deppe have referred it; but I am far from asserting that it is an *Helonias.* It is, however, more nearly allied to that genus, and, accordingly, it may be left for the present where Professor Don has placed it. Its seeds are the officinal part, and are used as those of *Veratrum Sabadilla.*"

Sabadilla seeds have long been employed for the destruction of vermin; few persons have ventured to administer them internally, in consequence of the violence of their action. Dr. Thomson, however, states that Schmucker has given as much as half a drachm of the powder in cases of tænia, but with what success, or under what precaution, we are not informed. The seeds are introduced into the present Pharmacopœia, somewhat prematurely perhaps, as a source of the alkaloid veratria.

VERATRIA.	VERATRIA.
℞ Sabadillæ contusæ, libras duas,	Take of Sabadilla Seed, bruised, two pounds,
Spiritûs rectificati, congios tres,	Rectified Spirit, three gallons,
Acidi Sulphurici diluti,	Dilute Sulphuric Acid,
Ammoniæ Liquoris,	Solution of Ammonia,
Carbonis Animalis purificati,	Purified Animal Charcoal,
Magnesiæ, singulorum quantum satìs sit;	Magnesia, of each as much as may be required;
Sabadillam cum spiritûs congio per horam coque in retortâ cui receptaculum aptatum est. Liquorem effunde, et quod restat cum altero spiritûs congio et spiritu recèns destillato iterùm coque, et liquorem effunde, idque tertiò	Boil the sabadilla with a gallon of the spirit for an hour, in a retort, to which a receiver is adapted. Pour off the liquor, and again boil what remains with another gallon of spirit, and the spirit recently distilled, and pour off the li-

fiat. Sabadillam exprime et ex liquoribus mixtis et colatis destillet spiritus. Quod restat ad idoneam extracti crassitudinem consume. Hoc in aquâ, cui paulùm acidi sulphurici diluti adjectum est, ter aut sæpiùs coque, et liquores colatos ad syrupi crassitudinem leni calore consume. Huic, ubi refrixerit, magnesiam ad saturationem usque immisce subindè agitans; tum exprime, et lava. Idem bis aut tertiò fiat; dein quod restat exsicca, et spiritu, leni calore, bis terve digere, et totiès cola. Postremò destillet spiritus. Reliquum, in aquâ cui paulum acidi sulphurici item carbo animalis adjectus est, coque in quartam horæ partem, et cola. Denique, carbone omni eloto, liquores cautè consume donec syrupi crassitudinem habeant, iisque ammoniæ tantum instilla, quantum ad veratriam dejiciendam satìs sit. Hanc separa, et exsicca.

NOTA.

VERATRIA. Minimè in aquâ, magìs in alcohole, maximè autem in æthere sulphurico liquatur. Non olet, sed amarum sapit. Non temerè adhibenda est.

quor. Let this be done a third time. Press the sabadilla, and let the spirit distil from the mixed and strained liquors. Evaporate what remains to the proper consistence of an extract. Boil this three times, or oftener, in water to which a little dilute sulphuric acid is added, and evaporate the strained liquors by a gentle heat to the consistence of a syrup. With this, when cold, mix the magnesia to saturation, frequently shaking them together, then press out and wash. Let the same be done twice or thrice; then dry what remains, and digest with a gentle heat in spirit two or three times, and strain as often. Afterwards let the spirit distil. Boil the residue in water to which a little sulphuric acid and animal charcoal are added, for a quarter of an hour, and strain. Lastly, the charcoal being thoroughly washed, cautiously evaporate the mixed liquors to the consistence of a syrup, and add as much ammonia as may be sufficient to throw down the veratria. Wash and dry it.

NOTE.

VERATRIA. It is very little soluble in water, more so in alcohol, but most so in sulphuric ether. It is inodorous, but tastes bitter. It is not to be rashly administered.

Mr. Phillips gives the following explanation of the above process:—"By being boiled in spirit, as directed, the cevadilla yields gallate of veratria, colouring matter, and some other compounds. When the residue, after the distillation of the alcohol, is treated with sulphuric acid, sulphate of veratria is formed; this is decomposed by magnesia, and the veratria set free, is separated from much of the matter with which it is mixed, by digestion and solution in spirit; when this is distilled off, the veratria is treated with sulphuric acid and animal charcoal, by which the sulphate of veratria is decolorized, and ammonia then added to it, sulphate of ammonia is formed, and veratria, on account of its insolubility, is precipitated."

Veratria is contained in the roots of the *Veratrum album*, and in other species. It is, when pure, in the form of a white powder, of a pungent, but not bitter taste, fusible below 212°, and concreting as it cools into a translucent yellow mass. Boiling water only dissolves about one-thousandth of its weight of veratria, but it is readily soluble in alcohol, and somewhat less so (contrary to the statement in the above note) in ether (PELLETIER *et* CAVENTOU, *Ann. de Chim. et Phys.* XIV. 76). It restores reddened litmus to blue, and neutralises the acids; its salts, with the exception of the supersulphate and hydrochlorate, are stated to be uncrystallisable.

The following, according to Pelletier and Caventou, are the proximate components of sabadilla seed:—

Fatty matter composed of	Elaine, Stearine, Cevadic Acid.
Wax.	
Acid Gallate of Veratria.	
Yellow colouring matter.	
Gum.	
Lignin.	
The residue of incineration contains	Carbonate of Potassa, Carbonate of Lime, Phosphate of Lime, Chloride of Potassium, Silica.

The ultimate composition of veratria appears, from the analysis of Couerbe to be—

	Atoms.	Equivalents.	Per Cent.
Carbon	34	204	71·24
Hydrogen	22	22	7·52
Oxygen	6	48	16·39
Nitrogen	1	14	4·85
Veratria	1	288	100·00

Medical Uses of Veratria.—This alkaloid is a powerful topical stimulant, and a most energetic sternutatory; its use has hitherto been almost entirely limited to external application in neuralgia and some other painful affections, and in some forms of paralysis. The following ointment and liniment have been used in such cases:—

℞ Veratriæ, ℈j. tere cum
Olivæ Olei, ʒj. et adde
Unguenti Cetacei, ʒvij.
Misce.

℞ Veratriæ, grana viij.
Solve in Alcohol,
Linimenti Saponis, āā fʒss.
Pro linimento.

These applications, however, require caution in their use, and, as an internal remedy the effects of veratria are too uncertain and violent to admit of safe employment. One-twelfth of a grain has excited vomiting and purging. Injected into a vein, also in very small quantity, Andral found it to cause death by tetanus, without any symptoms of local irritation (*see* VERATRUM).

SABINA. Savine. *Cacumina recentia et exsiccata.* The fresh and the dried tops of the *Juniperus Sabina. Cl.* 22. *Ord.* 13. Diœcia Monadelphia. *Nat. Ord.* Coniferæ, or Pinaceæ.

This plant is a native of the midland parts of Europe; it is cultivated as an ornamental shrub in our gardens. Its bark is reddish-brown; it has numerous subdivided branches; the leaves are small, erect, firm, opposite, and wholly invest the twigs; the flowers are male and female on different plants; the calyces of the male flowers stand in a conical catkin, consisting of three opposite flowers, placed in a triple row, and a single flower at the end: at the base of each flower is a broad scale, fixed laterally to a columnar pedicel; the filaments in the terminating flower are three, tapering, united at the base, and with simple anthers; in the lateral flowers, the filaments are scarcely perceptible, and the anthers are fixed to the scale of the calyx. The female flowers are composed of three small, permanent, scaly segments, growing to the germen; the petals are three, stiff, sharp, and permanent; the germen supports three styles, supplied with simple stigmas; the fruit is a round, tuberculated berry, containing three small seeds. This plant is said to have been used by the priests of the *Sabines*, in their religious ceremonies.

The odour of savine is strong and peculiar, its taste acrid and bitter; its active qualities appear chiefly to reside in an essential oil, of which it affords a considerable relative quantity on distillation, but which has not, I believe, been chemically examined. Savine is a powerful uterine stimulant, and is occasionally administered in amenorrhœa, though always requiring caution, lest it induce inflammatory action. There are also other disorders in which savine has been employed, such as gout and rheumatism; and it has been given as a vermifuge, in the dose of eight or ten grains of the powder twice or thrice a day. The principal use, however, of savine, is as an external stimulant, especially for keeping up the discharge of vesicated surfaces. The dried leaves in powder are sometimes sprinkled upon indolent and unhealthy sores; but the *Ceratum Sabinæ* of the Pharmacopœia is the most generally useful form for the application of this remedy; it induces a purulent discharge from blistered surfaces, with less irritation than cantharides.

CERATUM SABINÆ.	CERATE OF SAVINE.
℞ Sabinæ contusæ, libram,	Take of Savine, bruised, a pound,
Ceræ, libram dimidiam,	Wax, half a pound,
Adipis, libras duas;	Lard, two pounds;
Adipi et ceræ simŭl liquefactis sabinam immisce; tum per linteum exprime.	Mix the savine with the lard and wax melted together; then press them through linen.

In preparing this cerate, the savine is apt to be injured by heat. "It would be better to express the acrid juice from the fresh leaves, and mix it with the ointment when it begins to thicken by cooling. The ointment, when good, has a beautiful deep-green colour, and the odour of the fresh-bruised herb; it should be kept in closely-covered pots, as it soon loses its virtue by exposure to air." (*Lond. Disp.*)

The above direction for the preparation of this cerate is not sufficiently explicit; the lard and wax should be fused in a water-bath, and the bruised savine thoroughly triturated with them, and, after forcible expression of the whole through fine canvas, the melted cerate should be rubbed in a stone mortar, previously warmed, till it cools; it thus acquires an uniform consistence. But the properties of the essential oil of savine require to be more precisely ascertained, for an ointment containing it will probably be found preferable to the above.

SACCHARUM (*Sacchar*, Arab.) Sugar. SACCHARI FÆX. Treacle. *Succus præparatus.* The prepared juice of the *Saccharum officinale. Cl.* 3. *Ord.* 2. Triandria Digynia. *Nat. Ord.* Graminaceæ.

The *sugar-cane* is extensively cultivated in the East and West Indies, but its native country is uncertain. "There are two varieties of the officinal sugar-cane; the Creole, and the Otaheite. They are distinguished chiefly by the colour of the leaves, those of the former being much deeper than those of the latter. The root is jointed, and sends up several jointed stems, which rise in general to the height of eight or ten feet; a leaf springs from each joint, and the base of it embraces the stem to the next joint above its insertion, before it expands. From this point each leaf is about three or four feet long, and comparatively narrow, like a blade of grass, with the mid-rib broad and prominent on the under side, and the edges thin and sharply toothed. The flowers are whitish, in terminal panicles, two or three feet in length, and composed of subdivided spikes, with long flexuose down or lanugo, which encloses the flowers, and hides them from the sight. The seed is oblong, pointed, and ripens in the valves of the flowers." (THOMSON. *Lond. Disp.*)

Sugar, which is the produce of this plant, is in all respects a most important and interesting substance, considered in its commercial, chemical, and dietetic or economical relations. The process by which it is obtained from the above plant is sufficiently simple. The cane, when ripe, is cut off at the root, and its juice expressed between rollers; a small quantity of lime is immediately added, to diminish its tendency to fermentation; it is then evaporated, or boiled down, till of a proper consistency to granulate, when it is transferred into coolers, and after the *treacle*, or uncrystallisable part, has to a great extent run off, it is packed into hogsheads for exportation. It is further purified, or *refined*, here and elsewhere, and converted into pure or loaf sugar. (For the details of this process, see *Manual of Chemistry.*)

The general properties of cane sugar are well known: in reference to its ultimate chemical constitution, it belongs to that group of organic compounds which are atomically represented by carbon + water, its ultimate elements in the *anhydrous state* being—

	Atoms.	Equivalents.	Per Cent.
Carbon	12	72	44·4
Hydrogen	10	10	6·2
Oxygen	10	80	49·4
Sugar	1	162	100·0

Dobereiner regards crystallised sugar as a compound of 6 atoms of carbon, 6 of hydrogen, and 6 of oxygen, the carbon being equally divided between the oxygen and the hydrogen, so as to constitute a *carbonate of hydrocarbon.*

As an article of the Materia Medica, sugar is chiefly employed to cover the taste of nauseous remedies, and to prevent the spontaneous changes to which some vegetable products would be subject. It is to a certain extent nutritive, and in large quantity, aperient. It is useful in giving bulk to and subdividing some heavy powders and highly-active medicines. There are some persons with whom it disagrees, producing acidity at the stomach, and other troublesome dyspeptic symptoms; and there are cases of the relief of obstinate maladies of the stomach, by abstinence from sugar.

Treacle, which is an impure form of sugar, is sometimes used in forming powders into pill-masses.

SAFFRON, *see* Crocus.

SAGAPENUM. *Gummi-resina Ferulæ species incerta.* A gum-resin, the produce of an uncertain species of *Ferula.*

Sagapenum is imported from Smyrna and Aleppo, in masses made up of agglutinated pieces, of a pale and dark brown colour. It has a warm and alliaceous flavour, resembling weak assafœtida. It contains, according to Brandes,—

Volatile oil, resembling that of assafœtida	3·73
Bitter resin, soluble in ether, and which is rendered blue by warm muriatic acid	47·91
Tasteless resin insoluble in ether	2·37
Gum	32·76
Bassorin	4·48
Malate, sulphate, and phosphate of lime	1·10
Impurities	4·35
Water	3·30
	100

The medical properties of sagapenum resemble those of the other fetid gums, and it is generally administered in combination with them; upon the whole, however, it is an unimportant article of the Materia Medica. From five to ten grains are given in the form of pills, or as an adjunct to emmenagogues and antispasmodics. It enters into the composition of the compound galbanum pills, and the confection of rue; and is conjoined with aloes in the following formula:—

Pilulæ Sagapeni Compositæ.	Compound Pills of Sagapenum.
℞ Sagapeni, unciam,	Take of Sagapenum, an ounce,
Aloës, drachmam dimidiam,	Aloes, half a drachm,
Syrupi Zingiberis, quantum satis sit;	Syrup of Ginger, as much as may be sufficient;
Simul contunde, donec corpus unum sit.	Pound them together till incorporated.

From four to eight grains of this pill may be given in cases of hysteria and chlorosis, and for the relief of habitual costiveness in nervous and hypochondriac habits.

SAGO. *Medullæ Fæcula.* The starch of the pith of the *Sagus Rumphii. Cl.* 21. *Ord.* 6. Monœcia Hexandria. *Nat. Ord.* Palmaceæ.

Sago is the produce of several varieties of palm; it is prepared from the soft cellular substance of the trunk, which is blended with water, and the starchy deposit is granulated and dried. It has the leading chemical characters of starch, but has no claim to a place in the Materia Medica, being used exclusively as a light and agreeable farinaceous food. The palest sago, provided it is free from mustiness, is that which is preferred in trade.

SALICIN. *Willow Bark*, which is excluded from the Materia Medica of the present Pharmacopœia, has long been used as a febrifuge tonic, and frequently as a substitute for cinchona. It contains a crystallisable principle, *Salicin*, which is a valuable bitter, and may occasionally be employed as a substitute for sulphate of quinia. It exists in some willow bark to the extent of five per cent. It is obtained by adding subacetate of lead to a strong decoction of the bark so long as it occasions a precipitate (of tannate of lead), filtering, adding a little dilute sulphuric acid, to throw down any excess of lead, and then, excess of hydrate of lime or chalk. The filtered liquor yields crystals of salicin, which may be purified by solution in alcohol, and filtering through animal charcoal.

Salicin is soluble in about twenty parts of cold water; boiling water dissolves it abundantly. It has a bitter flavour; but it does not neutralise or combine with acids; in fact, it contains no nitrogen, and is therefore not an alkaloid. It consists of,

Carbon	55·5
Hydrogen	6·4
Oxygen	38·1
	100·0

When concentrated sulphuric acid is added to a very dilute solution of salicin, it gives it a deep orange colour; this has been proposed as a delicate test of the presence of salicin. "Boil a drachm of the bark with four ounces of water, filter, and digest the liquid over a drachm of finely-powdered oxide of lead; filter the decoloured liquid, precipitate any lead that it may contain, and evaporate down to the bulk of one ounce; put a little of the remainder into a watch-glass, and add a drop or two of concentrated sulphuric acid, when a red colour will be produced if salicin be present." (*Duflos.*)

Further experiments are wanting to establish the merits of this remedy as a febrifuge. A strong decoction of willow bark, with some aromatic adjunct, forms a cheap and useful tonic, as in the following formula:—

℞ Cort. Salicis contus. ℥iij.
Aquæ, oct. ij. decoque ad octarium
j. et cola.

℞ Colati liquoris, f℥vij.
Tincturæ Aurantii, fʒvj.
Syrupi Aurantii, fʒij.
M. sumat quartam partem ter die.

SAMBUCUS. *Flores.* Elder flowers. The flowers of the *Sambucus niger*. *Cl.* 5. *Ord.* 3. Pentandria Trigynia. *Nat. Ord.* Caprifoliaceæ.

The elder is a common indigenous tree, covered by rough gray bark. The leaves are pinnated, composed of five oval, pointed, serrated leaflets;

the flowers, which appear in June, are in terminal cymes, yellow, with the calyx superior and permanent, and the corolla monopetalous, rotate, and somewhat convex. The berries are globular, and of a purplish black when ripe. The term *sambucus* is from the Hebrew *Sambucca*, a musical instrument made of the hollow stems of the tree.

Water distilled from elder flowers acquires their peculiar odour, and is used as a vehicle for various cosmetic and ophthalmic applications. The *Unguentum Sambuci* is lard similarly scented; but no efficacy is in either case derived from the elder flowers. A jam or rob of elder-berries was formerly much esteemed as a diuretic laxative, and was used as a common domestic remedy for the cure of gravel.

The bark of the elder tree is said to be a hydragogue purgative, and emetic in large doses. It has been given in dropsy, and as an alterative in some cutaneous affections. The decoction, made by boiling an ounce of the bark in sixteen ounces of water down to ten, is the best form for its exhibition; of this, a fourth part may be taken two or three times a day.

In distilling elder-flowers, a butyraceous oil passes over along with the water, which is needlessly included among the *distilled oils* of the Pharmacopœia. The following are the other officinal formulæ:

Aqua Sambuci.	Elder-flower Water.
℞ Sambuci Florum, libras decem, *vel*	Take of Elder Flowers, ten pounds, *or*
Olei Sambuci, drachmas duas,	Oil of Elder Flowers, two drachms,
Spiritûs tenuioris, fluiduncias septem,	Proof Spirit, seven fluid ounces,
Aquæ, congios duos;	Water, two gallons;
Destillet congius.	Let a gallon distil.

Unguentum Sambuci.	Ointment of Elder.
℞ Sambuci Florum,	Take of Elder Flowers,
Adipis, singulorum libras duas;	Lard, of each, two pounds;
Adipi incoque sambuci flores, donec friabiles fiant; tum per linteum exprime.	Boil the elder flowers in the lard till they become crisp; then press through a linen cloth.

"This is used for the same purposes as the *Unguentum Cetacei*, over which it possesses no advantage but a pleasant smell." (*Phillips.*)

SAPO. Soap. *Sapo ex olivæ oleo et sodâ confectus.* Soap made of olive oil and soda. *Sapo mollis ex olivæ oleo et potassâ confectus.* Soft soap made of olive oil and potassa.

Hard soap, proper for pharmaceutical purposes, is made with soda and vegetable oil, generally olive oil. The white soap, usually called *Castille soap*, is that which is preferred; it should be nearly inodorous, and of a bland alkaline taste; not greasy, or efflorescent. It forms an opalescent solution in distilled water, and is perfectly soluble in alcohol, forming a solution which gelatinises if it be sufficiently concentrated. Soap is decomposed by the acids, and by acidulous and earthy salts; it is this reaction which causes soap to become milky, and often to form insoluble compounds when used with *hard water*, and the purity of water and its fitness for washing and general domestic purposes, may be well judged of by the alcoholic test, which produces a degree of turbidness proportionate to the saline impurities (see page 81).

Soap is used internally as a remedy for uric gravel, and in large doses is said to prove singularly effectual; but it is extremely apt to impair the digestive powers of the stomach, and lay the foundation of obstinate dyspepsia. Soap is a proper addition to pills which are intended to be kept for any time; it prevents their induration, and renders them more soluble in the stomach; it also modifies the efficacy of some of the purgatives, probably by increasing the solubility of their active parts. Soap is a good addition to spirituous liniments; it renders them less rapidly vaporisable, and better adapted for friction upon the part affected.

Soap is decomposed by several vegetable decoctions and infusions; being almost always at hand, it is occasionally useful as an antidote to some poisons, such as metallic salts and acids; in these cases a teacupful of a strong solution of soap in warm water should be swallowed as soon as possible; if it produce vomiting, the dose should be repeated. Added to plasters, soap prevents their induration.

Soap, scraped into thin shavings, and dried by a gentle heat, may be reduced to powder, and is used in this state as an ingredient in cleansing hand-powders; such, for instance, is the *Pulvis Saponis mundificans* of the *Pharmacopœia Batava*, composed of 12 ounces of finely-powdered Spanish soap, 2 ounces of effloresced carbonate of soda, 3 ounces of powdered orris root, 2 pounds of fine almond meal, and of the essential oils of lemons, lavender, and bergamot, each 40 drops, with 10 drops of oil of cloves.

The common soaps are compounds of stearic, margaric, and oleic acids, with alkaline bases (see *Manual of Chemistry*).

Soft soap is made with potassa instead of soda. Common soft soap, made with potash-ley and tallow, is an excellent detergent for the destruction of vermin.

The following are the principal formulæ of the Pharmacopœia in which soap is concerned:—

PILULÆ SAPONIS COMPOSITÆ.	COMPOUND SOAP PILLS.
℞ Opii duri contriti, unciam dimidiam,	Take of hard Opium, in powder, half an ounce,
Saponis, uncias duas;	Soap, two ounces;
Simul contunde donec corpus unum sit.	Pound them together till incorporated.

Five grains of this pill contain one grain of opium; it is a useful formula, especially when it is wished that the word *opium* should not appear in the prescription.

CERATUM SAPONIS.	SOAP CERATE.
℞ Saponis, uncias decem,	Take of Soap, ten ounces.
Ceræ, uncias duodecim cum semisse,	Wax, twelve ounces and a-half,
Plumbi Oxydi contriti, uncias quindecim,	Oxide of Lead, in powder, fifteen ounces,

Olivæ Olei, octarium,	Olive Oil, a pint,
Aceti congium;	Vinegar, a gallon;
Coque acetum cum plumbi oxydo, lento igne, assiduè movens, donec in unum coëant; dein adjice saponem, et iterùm simili modo coque, donec humor omnis consumptus fuerit; denique his ceram, ex oleo priùs liquefactam, misce.	Boil the vinegar with the oxide of lead over a slow fire, assiduously stirring them till they unite; then add the soap, and again boil in the same manner till all the moisture is evaporated; lastly, with these mix the wax previously dissolved in the oil.

This cerate will sometimes soothe and allay irritation, when other forms of lead fail, so that it is not unfrequently used as a cooling dressing.

Emplastrum Saponis.	Plaster of Soap.
℞ Saponis concisi, libram dimidiam,	Take of Soap, sliced, half a pound,
Emplastri Plumbi, libras tres;	Lead Plaster, three pounds;
Emplastro liquefacto saponem admisce, tum ad idoneam crassitudinem decoque.	Add the soap to the melted plaster, then boil down to a proper consistence.

This is a useful plaster when others irritate, and, with the addition of a little resin, forms a mild adhesive plaster. It is one of the best corn plasters.

Linimentum Saponis, *see* Camphora, p. 144.

SARZA. *Radix.* Sarsaparilla. (*Spanish*, from *Zarza*, a bush; and *Parilla*, a little vine.) The root of the *Smilax officinalis.* *Cl.* 22. *Ord.* 6. Diœcia Hexandria. *Nat. Ord.* Smilaceæ.

The root commonly known under the name of Sarsaparilla (corrupted, probably for the sake of brevity, in the present Pharmacopœia, into *Sarza*), is apparently obtained from several species of *Smilax.* The variety which is most esteemed is said to be the produce of the *Smilax officinalis* (of Humboldt and Bonpland), which grows upon the banks of the river Magdalena, near Bojorque, in South America. It is called *sarsaparilla* by the natives of the district, who send it in large quantities to Carthagena and Mompox, whence it is shipped for Jamaica and Cadiz: it is that variety of the root which is known in our market under the name of *Jamaica sarsaparilla.* The following are the specific characters of the *S. officinalis*, as given by Dr. Lindley (*Flora Medica*). "Stem twining, angular, prickly, smooth, the young shoots unarmed. Leaves ovate-oblong, acute, cordate, netted, five to seven nerved, coriaceous, smooth, a foot long, and four to five inches broad; the young ones lanceolate, oblong, acuminate, three-nerved; petioles an inch long, smooth, bearing tendrils above the base. Flowers unknown."

Jamaica Sarsaparilla (or *red sarsaparilla*) is made up into small bundles, not trimmed or closely packed, and tolerably free from impurities; when opened out, it presents long slender runners, issuing from a common root, and more or less abundant in small fibres; it has a deep reddish-brown cuticle, and the interior has the same tint. When chewed, it tinges the saliva, is not particularly mucilaginous, and after a while tastes bitterish, with a slight and peculiar acrimony; it affords a pale-brown powder. It yields a larger quantity of extractive and less amylaceous matter than the other varieties, and appears to be that of which Pfaff has given the following analysis:—

Pungent extractive	2·5
Bitter extractive	3·7
Resin	2·0
Common extractive	9·4
Gum, starch, and albumen	3·6
Woody fibre	75·0
Water and loss	3·8
	100

Honduras Sarsaparilla (*mealy sarsaparilla*) is probably the produce of the *Smilax siphilitica* of Willdenow. "It is found in the woods of tropical America, on the banks of the river Cassiaquiare, between Mandivaca and San Francisco Solano."—"Stem round, smooth, furnished only at the knots with two to four short, thick, straight prickles. Leaves a foot long, oblong, lanceolate, coriaceous, shining, acuminate, three-nerved, terminated by a long point. In South America, a kind of sarsaparilla is produced by the roots of this, which is held in the highest estimation. Martius is said to have found it in the Brazils at Yupura, and by the Rio Negro." (Lindley. *Flora Medica.*)

Honduras sarsaparilla is imported from the bay of Honduras; it is found in the drug-market in larger bundles than the former; it is exteriorly of a dirty or grayish brown, and exhibits a white amylaceous interior, surrounding the central fibre; it is readily torn or divided longitudinally, and is the kind of sarsaparilla which is usually seen in druggists' shops, cut into small split lengths. It has less taste than the former, but when long chewed, the same distinctive flavour is perceptible. The bundles are usually so made up as to exhibit a fair exterior, and large and fine lengths are generally rolled transversely round them. When opened out, the root is smaller within, and often black, damaged, or decayed; stones or clumps of wood are often wrapped up in the centre. The following analysis of sarsaparilla, by Cannobio, seems to refer to this species:—

Bitter pungent resin	2·8
Gummy extractive	5·5
Starch	54·2
Woody fibre	27·8
Water and loss	9·7
	100

Lisbon Sarsaparilla. The sarsaparilla which is found in the drug-market under this name, is made up into neat cylindrical bundles, generally smoothed or cut at the ends, and about a yard in length and ten inches in diameter. It is not in much estimation when the preceding varieties can be procured. It is more woody, and less abundant in soluble matter. It is said to be the produce of Brazil, growing between the sources of the Orinoco and the Rio Negro; but as most of the varieties of sarsaparilla were formerly imported through Lisbon, there are other kinds which occasionally bear this name in the market.

Lima Sarsaparilla is a variety which more resembles the *Jamaica* than any other; but it is in larger bundles, and altogether a coarser and less select article; it is in considerable demand in the London market, that which is freshest, cleanest, and most fibrous being preferred.

Vera Cruz, or Mexican Sarsaparilla is, according to Lindley, the produce of the *Smilax medica.* "Scheide, who found it on the eastern slope of the Mexican Andes, says it is carried from the villages of Papantia, Tuspan, &c., to Vera Cruz, under the name of *Zarzaparilla*, and is there introduced into the European market. He was told that the roots are gathered all the year long, dried, and then tied in bundles for sale." Vera Cruz sarsaparilla is little known in the London drug-market, and esteemed of very inferior quality.

Besides the above-quoted analyses, several others have been published, aiming at more precision, and at the discovery of what may be termed the *active principle* of sarsaparilla, but the results of these inquiries are too much at variance with each other to enable us to draw any satisfactory chemical conclusions upon the subject, and are at present wholly unimportant as regards the therapeutic agencies of this root. Batka (*Journ. de Pharm.* xx. 43) states the following as the proximate principles of sarsaparilla:—1. A crystalline matter. 2. A coloured crystalline matter. 3. An essential oil. 4. Gum. 5. Bassorin. 6. Starch. 7. Albumen. 8. Extractive. 9. Gluten. 10. Lignin. 11. Pectic acid. 12. Acetic acid. 13. Chloride of calcium, potassium, magnesium, carbonate of lime, oxide of iron, and alumina.

In 1825, Palotta gave the following process for obtaining an alkaloid which he termed *parilline.* The decoction of the powdered root was filtered and mixed with milk of lime; a gray precipitate was obtained, which was washed, dried, and boiled in alcohol of the specific gravity 0·817. The alcoholic decoction was filtered and distilled, and the residue deposited parilline. It is described as a white powder, of a peculiar odour, and a bitter, sharp, and slightly astringent and nauseous taste, rendering tumeric brown, fusible, only sparingly soluble in hot water, neutralising and forming salts with the acids, sparingly soluble in cold alcohol, but readily soluble in boiling alcohol. Palotta further states that in the dose of thirteen grains, parilline nauseates and vomits, diminishes the quickness of the pulse, and excites diaphoresis. Its ultimate elements are—

Carbon	62·8
Hydrogen	9·3
Oxygen	27·9
	100·0

Folchi states that, when the interior pithy part of sarsaparilla is macerated in water, and the solution, after treating it with animal charcoal, left to spontaneous evaporation, a substance separates in small pale-yellow crystals, sparingly soluble in alcohol, with little taste, but leaving an impression of acrimony in the throat, and greening the blue of violets; he terms it *Smilacin.* (Berzelius. *Handbuch*, iii.)

Thubeuf gives the following process for obtaining what he terms *sasseparin.* (*Journ. de Pharm.* x.) Digest the root in warm alcohol, and distil off seven-eighths of the tincture; digest the residue for twenty-four hours with animal charcoal, and filter while hot. On cooling, crystals are deposited, which may be purified by repeated solutions and crystallisations. When pure, the crystals are white, bitter when dissolved, difficultly soluble in cold water, soluble in alcohol, and these solutions froth when agitated. They are soluble in hot ether, in volatile oils, and sparingly in fixed oils. When heated, they fuse, and are charred. They are soluble in dilute acids and alkaline solutions, and are thrown down in powder when the acids or alkalis are saturated. Sulphuric acid gives it a dark red colour, which passes into violet and yellow, but water separates it unaltered. Nitric acid converts it into a yellow substance. It is obtained in beautiful crystals by the slow evaporation of its hydrochloric solution. Its ultimate components are—

Carbon	63·2
Hydrogen	8·7
Oxygen	28·1
	100·0

Lastly, Batka concludes that the substance described by Pallotta is an acid, and calls it *parillinic acid* (*Journ. de Pharm.* xx.); and Poggiale, after examining the various results of the preceding analysts, concludes that, under different names, they have described one and the same substance. (*Journ. de Chim. et Med.* x.)

It is impossible, from these statements, to arrive at any very satisfactory conclusions regarding the nature or properties of the principle thus said to be contained in sarsaparilla; that it is not an alkaloid, appears probable from the absence of nitrogen, in which the different authorities agree; and the facility with which weak alkaline solutions act upon and appear to dissolve the active matter of sarsaparilla, has been urged by some as a reason for supposing that it has the character of an acid.

The virtues of sarsaparilla have been very differently estimated; the evidence is, however, decidedly in its favour as a valuable *alterative* remedy; for it has cured cutaneous eruptions, nodes, anomalous pains in the bones and joints, and other symptoms which arise in certain constitutions, and are often considered as the joint effect of mercury and of the venereal virus, though frequently independent of either: in such cases we have ample testimony in its favour. As an antidote to syphilis, for which it seems originally to have been introduced, it deserves no confidence. Mr. Pearson observes, "that its beneficial effects are often demonstrated in the treatment of foul untractable spreading sores, and in more than one form of scrofula." In some of those debilitated states of body announcing a broken constitution, sarsaparilla has been effectually prescribed. It requires to be taken in large doses, and long persevered in.

In debilitated habits, it sometimes excites profuse perspiration, an effect which may, to a certain extent, be prevented by combining with it small doses of dilute sulphuric acid, where such a remedy is not contra-indicated. Sometimes it agrees best with the stomach when conjoined with small quantities of alkalis. Sometimes it acts upon the bowels; but generally none of these bad effects result from it, and in the cases alluded to it relieves pain, the patient gets comfort and sleep, and often singularly acquires flesh during its use.

Sarsaparilla is occasionally administered in the form of powder, but this unnecessarily loads the stomach with a quantity of indigestible woody fibre, so that either an *extract*, a strong *decoction*, or a *syrup*, are usually substituted.

EXTRACTUM SARZÆ.	EXTRACT OF SARSAPARILLA.
℞ Sarzæ concisæ, libras duas cum semisse,	Take of Sarsaparilla, cut, two pounds and a-half,
Aquæ destillatæ ferventis, congios duos;	Boiling distilled Water, two gallons;
Macera per horas viginti-quatuor; tum decoque ad congium, et liquorem adhuc calentem cola; denique ad idoneam crassitudinem consume.	Macerate for twenty-four hours; then boil down to a gallon, and strain the liquor whilst hot; lastly, boil it down to the proper consistency.

The proportion of extract afforded by sarsaparilla is very various, and samples of the root apparently resembling each other yield it in very different quantities. From twenty to thirty pounds have been obtained from one hundred-weight.

In this and all the other preparations of sarsaparilla, great attention should be paid to the selection of the root, the Jamaica sarsaparilla being certainly preferable to the other varieties. It should not be made, as it often is, of the chumps, and inferior bundles of the root which are rejected in garbling it for sale; and great care should be taken not to injure it by excess of heat during evaporation, which should always be performed by a steam-heat very little above 212°. It is no doubt a convenient and portable form of sarsaparilla, but other preparations are more certain, and, among them, what has been termed a *liquid extract*, consisting of the decoction of sarsaparilla, so far concentrated by boiling down, that a fluid ounce contains an ounce weight of the dry extract. This, when carefully and honestly prepared, is an excellent form of the remedy, and one which will seldom disappoint the practitioner. The addition of a few cloves, allspice, or a little orange-peel is sometimes thought to improve its flavour. The dose of the extract is from two to three or four drachms twice a day; and of the above liquid extract, the same quantity in fluid measure. It may be diluted with a wine-glassful of water.

It is stated in the *London Dispensatory*, "that it appears by Mr. Pope's experiments, that by submitting the root, cut transversely, to the action of steam, or of distilled water, at a temperature somewhat below boiling, an elegant soluble extract may be obtained, containing all the virtues of the plant, not liable to decomposition, and applicable to the various purposes of extemporaneous prescription, whilst, by the method ordered in the formula of the London College, an insoluble inefficacious extract only is obtained." The extract is certainly sometimes injured by heat, and otherwise carelessly prepared, but it by no means necessarily follows that by adopting the usual method, the extract should either be insoluble or without efficacy.

Decoctum Sarzæ.	Decoction of Sarsaparilla.
℞ Sarzæ concisæ, uncias quinque,	Take of Sarsaparilla, sliced, five ounces,
Aquæ destillatæ ferventis, octarios quatuor ;	Boiling distilled Water, four pints;
Macera per horas quatuor, in vase levitèr clauso, prope ignem; tum sarzam exime et contunde. Contusam liquori redde, et iterùm simili modo macera per horas duas; dein decoque ad octarios duos, et cola.	Macerate for four hours in a lightly-covered vessel near the fire ; then take out, and bruise the sarsaparilla. When bruised, return it to the liquor, and again macerate in the same manner for two hours ; afterwards boil down to two pints, and strain.

Nothing is gained by the troublesome macerations and bruisings directed in this formula; the root should be well beaten and bruised, or crushed, before it is subjected to boiling, and then it easily yields the whole of its active and soluble matter. But as each fluid ounce of the above decoction only contains the extractive of one drachm of sarsaparilla, it is scarcely strong enough for any useful purpose, and where a course of sarsaparilla is to be adopted, the liquid extract or concentrated decoction must be resorted to, if any real benefit is expected to accrue from the specific action of the remedy.

Decoctum Sarzæ Compositum.	Compound Decoction of Sarsaparilla.
℞ Decocti Sarzæ ferventis, octarios quatuor,	Take of boiling Decoction of Sarsaparilla, four pints;
Sassafras concisæ,	Sassafras, sliced,
Guaiaci Ligni rasi,	Guaiacum Wood, rasped,
Glycyrrhizæ contusæ, singulorum drachmas decem,	Liquorice Root, bruised, of each, ten drachms,
Mezerei, drachmas tres ;	Mezereum, three drachms;
Decoque per quartam horæ partem, et cola	Boil for a quarter of an hour, and strain.

Mezereum is the only active addition to the above decoction; but it is added in such small quantity, and is of such doubtful efficacy, that it can scarcely be considered as an important adjunct: the guaiacum wood is useless, but the sassafras and liquorice confer warmth and sweetness, which may possibly suit some stomachs and palates. The celebrated *Lisbon Diet-drink* was a similar preparation.

The dose in which these decoctions are usually given is from four ounces to a pint or more daily. They have been prescribed in chronic rheumatism ; in obstinate cutaneous eruptions; in indolent ulcers; in glandular affections; in diseases of the periosteum and bone attended by obscure pains, wasting of the flesh, tenderness of the part, tumours and nodes; and in that state of the habit known among medical men under the term *cachexia*, but which it is not easy to define: in such cases, sarsaparilla, as has been above remarked, often proves a valuable remedy, and sometimes effects a cure when other alteratives have long been administered in vain, and where the diseased state of the system has been of many years' duration. It may be well to repeat, that to ensure success, attention must be paid to the quality of the sarsaparilla, and to its preparation, and it must be taken in large doses, and for a long time; hence the advantage of the concentrated decoctions, of solution of extract in decoction, of a concentrated syrup, and other analogous forms. Inattention to the quality of the drug, administering it in insufficient quantity, and want of perseverance in its use, are, I think, the sources of those opinions of its inefficacy which we often hear quoted. In the after-treatment of syphilis, and in cases where mercury has unkindly affected the system, and in pseudo-syphilis, sarsaparilla possesses restorative powers not hitherto observed in any other article of the Materia Medica.

SYRUPUS SARZÆ.	SYRUP OF SARSAPARILLA.
℞ Sarzæ concisæ, uncias quindecim,	Take of Sarsaparilla, sliced, fifteen ounces;
Aquæ ferventis, congium,	Boiling Water, a gallon,
Sacchari, uncias quindecim;	Sugar, fifteen ounces;
Macera sarzam in aquâ per horas viginti quatuor; tum decoque ad octarios quatuor, et liquorem adhuc calentem cola; dein adjice saccharum et ad idoneam crassitudinem consume.	Macerate the sarsaparilla in the water for twenty-four hours; then boil down to four pints, and strain the liquor whilst hot; then add the sugar, and evaporate to a proper consistence.

A very strong decoction of sarsaparilla, made into a syrup, was originally recommended by Mr. Fisher, of Conduit Street, as a convenient and portable form for the administration of that remedy; it is not liable to ferment, nor is it disagreeable when diluted with water. It has lately been very generally prepared and much prescribed. The sugar is apt to disagree with some stomachs, which is sometimes prevented by adding five to ten drops of solution of potassa to each dose. But the above syrup is not of sufficient strength to render it an effective form of sarsaparilla; it ought to be of such strength as that one ounce is equal to a pint of the *simple decoction;* of this, half an ounce, or six drachms, may be taken two or three times a day, diluted with about two parts of water. It should be prepared with great nicety and caution, and the selection of the sarsaparilla most carefully attended to.

SASSAFRAS. *Radix.* The root of the *Laurus Sassafras. Cl.* 9. *Ord.* 1. Enneandria Monogynia. *Nat. Ord.* Lauraceæ. (*Sassafras officinalis.* LINDLEY, *Flora Medica.*)

This is a small tree, native in the woods of North America from Canada to Florida. It is cultivated in Jamaica; and will bear the cold of our climate. Its leaves are membranous, bright green, smooth above, finely-downed beneath, very variable in form, some being obovate, others deeply three-lobed, and some lobed only on one side; all, however, tapering in a wedge-like manner into the petiole. Racemes naked, downy, with subulate, deciduous bracts. Fruit bright blue, rather larger than a pea, upon red clavate peduncles.

Sassafras is imported in logs with more or less of the bark upon them; they consist of the root and trunk, the wood of which is cut into shavings for medical use. It has a warm and sweetish aromatic flavour, most powerful in the bark, and yields, on distillation with water, an essential oil, the properties of which have been examined by Bonastre. (*Journ. de Pharm.* XIV.)

Oil of sassafras is heavier than water, its specific gravity being about 1·09, but when shaken with water it separates into a heavy portion which sinks, and a lighter portion which floats upon the surface. It was supposed that the lighter portion was oil of turpentine with which the oil of sassafras had been adulterated, but Bonastre has shown that this is not the case. The adulterations usually practised upon it, and the means of detecting them, are stated in his paper.

Infusions and decoctions of sassafras were formerly in high repute as antisyphilitics and lithontriptics, but have now fallen into disuse: they are diuretic and diaphoretic, and therefore alterative; they have been employed in gout, rheumatism, and cutaneous affections, and are still used in conjunction with guaiacum and sarsaparilla, but may on the whole be regarded as unimportant. The name *sassafras* implies the supposed virtues of this plant in destroying stone in the bladder (from *saxum frango.*)

In Louisiana the dried leaves, in consequence of the quantity of mucilage which they contain, are used for thickening broth.

SCAMMONIUM. (A corruption of the word *Chamozah*, Arabic.) *Gummi resina.* Scammony; the gum-resin of the *Convolvulus Scammonea.* *Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Convolvulaceæ.

This is a common plant in Greece and the Levant. It has a long, tapering root, sending up long twining stems, with smooth, bright-green, arrow-shaped leaves, on long footstalks: the flowers are in pairs upon the pedicels, consisting of a double calyx and four emarginated leaflets in each row: the corolla is yellow, funnel-shaped, and plaited. The capsule is three or four-celled, and contains small seeds.

The root of this plant furnishes, by incision, a milky juice, which concretes into the *scammony* of commerce, a substance chiefly imported from Aleppo. The mode of collecting it is described by Dr. Russell. (*Hist. of Aleppo.*) The ground is cleared away from the root, the top of which is cut off in a sloping direction, and the milky juice which flows is collected in a shell, each root yielding only a few drachms, which run off in the course of twelve hours. The juice of several roots is put together, and it soon hardens, forming *genuine scammony.* The Jews purchase it while soft, and mix it with the expressed juice of the stalks and leaves, flour, ashes, sand, and whatever else that answers the purpose.

Scammony occurs in various states of purity; and an extremely inferior and evidently adulterated article is brought from Smyrna in cakes, said to be the produce of a species of *Secamone*, and occasionally of the *Cynanchum Monspeliacum*, or *Montpelier scammony.*

Aleppo scammony comes into the market in packages called *drums*, weighing about 100 pounds each: it is massive, or more or less porous, of a dark olive colour externally, and, when broken, exhibiting in some parts of its interior a gray or greenish-brown tint and a softer texture. It has a peculiar caseous odour, which should be strong and fresh, and it should *lactify*, or easily rub into a milky mixture with water. Those drums which are very soft in the interior, of a pale or dirty green colour, of a fetid or nauseous odour, or those which are black and inodorous, and which do not become superficially milky when wetted and rubbed, and are very heavy, are of doubtful purity. It is said that a factitious article, composed of jalap, senna, manna, gamboge, and ivory black, is sometimes sold for scammony. The colour of *good scammony* in powder is light greenish-gray, with a tint of green, and when rubbed up with water it forms a pale greenish-gray emulsion, without deposit, and strongly smelling of the drug.

According to Bouillon-Lagrange and Vogel, Aleppo scammony consists of—

Resin	60
Bitter extractive	2
Gum	3
Insoluble matter and sand . . .	35
	100

100 parts of Smyrna scammony afforded—

Resin	39
Bitter extractive	5
Insoluble matter and impurities . .	66
	100

From the quantity of insoluble residue afforded by these analyses, it is obvious that a very impure article must have been examined; the fact is, that at present scammony may be had of all degrees of purity, containing, that is, from 4 or 5 up to 80 or 85 per cent. of foreign matter, and at all prices between fourteen and thirty-two shillings per pound: the cheaper varieties, amongst other impurities, usually contain so large a quantity of carbonate of lime, as to effervesce with a diluted acid like a piece of lime-stone; they are not intrinsically worth half-a-crown a pound, and are said to be manufactured expressly for the English market, the most celebrated in the world for the consumption of *cheap* and consequently spurious drugs.

The *resin* of genuine scammony is very soluble in alcohol; that from Aleppo scammony is paler coloured than the resin of Smyrna scammony, and may be rendered perfectly colourless by animal charcoal, without detriment to its purgative qualities.

Scammony is a very useful drastic purge in conjunction with others of the same class, being rarely given alone, in consequence of its uncertain operation and tendency to gripe. It enters into several of the compound purgatives of the Pharmacopœia, and is a good auxiliary to calomel, especially for cleansing the bowels of children, when loaded, as they sometimes are, with viscid mucus. For this purpose, the old *Pulvis Basilicus*, composed of equal parts of calomel, scammony, and jalap, is an effective mixture; but it will not always remain upon the stomach. Spirit is a good solvent for scammony, but it is rarely used in tinctures. Its average dose is from five to fifteen grains. Its activity resides in its resinous part; the residue is inert. In some old Pharmacopœiæ, a variety of methods of correcting the acrimony of scammony are described, and to such preparations they gave the name of *diagrydia*. According to Planche (*Journ. de Pharm.* XVIII. 184) milk is an excellent vehicle for the resin of scammony; when triturated with it, it forms a permanent emulsion: he conjoins it with very small doses of hydrocyanic acid, as in the following purgative mixture:

Take of Resin of Scammony decoloured by animal charcoal, eight grains,
Milk, either hot or cold, three ounces,
Sugar, two drachms,
Laurel Water, four drops;
Triturate them together.

The following officinal formulæ of scammony are directed in the *London Pharmacopœia*:—

PULVIS SCAMMONII COMPOSITUS.	COMPOUND POWDER OF SCAMMONY.
℞ Scammonii,	Take of Scammony,
Extracti Jalapæ duri, singulorum uncias duas,	Hard Extract of Jalap, of each two ounces,
Zingiberis, unciam dimidiam;	Ginger, half an ounce;
Separatim in pulverem subtilissimum tere; dein misce.	Rub them separately into a very fine powder; then mix them.

This is a good purge, the activity of the scammony being aided by the jalap, and corrected by the ginger. The dose is from eight to fifteen or twenty grains.

CONFECTIO SCAMMONII.	CONFECTION OF SCAMMONY.
℞ Scammonii contriti, unciam cum semisse,	Take of Scammony, in powder, an ounce and a half,
Caryophylli contusi,	Cloves, bruised,
Zingiberis contritæ, singulorum drachmas sex,	Ginger, in powder, of each six drachms,
Olei Carui, fluidrachmam dimidiam,	Oil of Caraway, half a fluidrachm,
Syrupi Rosæ, quantum satis sit;	Syrup of Roses, as much as may be required;
Arida simul in pulverem subtilissimum tere et conserva; tum, quotiès confectione utendum est, instillato syrupo, iterùm tere; denique adjecto oleo carui, omnia misce.	Rub the dry ingredients together to a very fine powder, and preserve them; then, whenever the confection is to be used, the syrup being gradually poured in, rub again; lastly, having added the oil of caraway, mix them all.

The dose of this confection, which was formerly in vogue as a stimulating cathartic, is about half a drachm; it is, however, rarely prescribed, and might without inconvenience have been omitted.

SCILLA. *Bulbus recens.* Squill. The fresh bulb of the *Scilla maritima. Cl.* 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Liliaceæ.

The squill is a native of Spain, Portugal, Sicily, and the Levant, growing in sandy places, and generally near the sea. "The bulb is roundish-ovate, very large, half above ground, with the integuments either pale-green or red. Leaves appearing long after the flowers, broad-lanceolate, channelled, spreading, recurved. Scape about two feet high, terminated by a rather dense, long ovate raceme. Flowers about three-fourths of an inch across, spreading, pale yellowish-green, with a green stain along the middle of each segment. Filaments shorter than the segments of the perianth. M. Steinheil rightly separates this plant from the numerous species to which the name of *scilla* has, in modern times, been applied; it differs essentially in having large winged seeds and three nectariferous glands at the apex of the ovary." (LINDLEY. *Flora Medica.*)

The bulbs are imported from the Levant, packed in wet sand; they have a nauseously bitter and very acrid flavour, and are generally cut into slices, and dried for pharmaceutical use; an operation which ought not to be performed at a temperature exceeding 212°. The peculiarities of squill have been referred to a distinct bitter principle, called by Vogel *scillitin*, according to whom 100 parts of the bulb (dried?) consist of

Scillitin, and a little sugar	45
Tannin	24
Gum	6
Fibre, with citrate of potassa	30
Loss	5
	100

The *red* and the *white* squill, are both met with in the drug market; they do not differ essentially in composition: the latter is, however, generally preferred, and if purchased in the dried state, should be free from mouldiness, and of a pale buff tint. "The dry outer scales of the bulb, and the young and tender interior ones, are inert, or nearly so, and should be rejected; the intermediate scales are, for obvious physiological reasons, the part in which the energy of the plant principally resides." (*Lindley.*)

Squill is an important article of the Materia Medica; when administered in large doses, it is purgative and emetic; but it is chiefly employed in smaller doses as an expectorant and diuretic, in conjunction with other remedies. From half a grain to a grain of powdered squill, with three grains of ammoniacum, may be given every six hours to increase and facilitate expectoration; in some cases it may properly be conjoined with the fetid gum-resins; in others, where there is heat and febrile tendency, it may be given with antimonials and saline remedies. Conjoined with demulcents, and occasionally with ipecacuanha, the tincture of squill relieves the troublesome irritation of common coughs and hoarseness.

As a diuretic, squill is combined with calomel, digitalis, opium, and other adjuncts; but in cases attended by any degree of active inflammation, it should scarcely be administered, unless accompanied by aperients and diaphoretics, and occasionally by venesection.

As an emetic, squill is seldom resorted to except in the chronic coughs of old persons, and occasionally where the bronchiæ are loaded with viscid mucus: in such cases, half an ounce of the oxymel in two ounces of warm water is sometimes successfully resorted to. "Squill," Dr. Thomson says, "is a very uncertain emetic, a very small dose producing the most cruel vomiting in some persons, while in others the largest doses do not even excite nausea: where, however, it readily and moderately induces vomiting, it proves more useful in whooping-cough and croup than any other emetic."

In large doses, squill has the properties of a narcotico-acrid poison. It produces vomiting, diarrhœa, bloody urine, and ultimately narcotic symptoms. "Lange mentions an instance of a woman who died from taking a spoonful of the root in powder to cure tympanitis. She was immediately seized with violent pain in the stomach, and in a short time expired in convulsions. The stomach was found everywhere inflamed and in some places eroded. Twenty-four grains of the powder have proved fatal. I have seen a quarter of an ounce of the syrup of squills, which is a common medicinal dose, cause severe vomiting, purging, and pain." (Christison, *On Poisons*, Chap. xxxvi.)

These statements are sufficient to point out the caution with which full doses of squill should be given, especially in delicate habits.

The officinal formulæ of squill are the following:—

Tinctura Scillæ.	Tincture of Squill.
℞ Scillæ recèns exsiccatæ, uncias quinque,	Take of Squill, recently dried, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

Of this useful form of squill, from twenty to thirty minims in ten or twelve drachms of liquid is considered as a full dose for an adult, and as about equivalent to a grain of the powdered squill. The tincture varies considerably in colour, according as it is prepared with the pale or red squill. The common saline draught, or almond mixture, or ammoniacum mixture, are good vehicles for this remedy.

Acetum Scillæ.	Vinegar of Squill.
℞ Scillæ recèns exsiccatæ, uncias quindecim,	Take of Squill recently dried, fifteen ounces,
Aceti destillati, octarios sex,	Distilled Vinegar, six pints,
Spiritûs tenuioris, octarium dimidium;	Proof Spirit, half a pint;
Scillam macera cum aceto, leni calore, in vase vitreo clauso, per horas viginti quatuor; dein exprime, et sepone, ut fæces subsidant; denique liquori defæcato spiritum adjice.	Macerate the squill with the vinegar in a gentle heat, in a closed glass vessel, for twenty-four hours; then press it out and set by, that the dregs may subside; lastly, add the spirit to the clear liquor.

This preparation is apt to become turbid by keeping, and has nothing to recommend it in preference to the tincture. The dose is from half a drachm to two drachms, in any vehicle with which vinegar is not incompatible.

OXYMEL SCILLÆ.	OXYMEL OF SQUILL.
℞ Mellis, libras tres, Aceti Scillæ, octarium cum semisse; Decoque in vase vitreo, lento igne, ad idoneam crassitudinem.	Take of Honey, three pounds, Vinegar of Squill, a pint and a half; Boil down in a glass vessel, with a slow fire, to the proper consistence.

From half a drachm to two drachms of this oxymel may be given as an expectorant, or half an ounce as an emetic, in cases where such a remedy is wanted. The evaporation required to reduce it to a due consistency is objectionable, and it should be prepared with an acetic solution of squill strong enough, when mixed with the despumated honey heated in a water-bath, to form a compound of proper consistency.

A mixture of equal parts of this oxymel and syrup of poppy, is a valuable sedative expectorant when taken in small and often-repeated doses, and when gently swallowed in an undiluted state it allays the irritation of catarrhal cough and hoarseness.

PILULÆ SCILLÆ COMPOSITÆ.	COMPOUND PILLS OF SQUILL.
℞ Scillæ recèns exsiccatæ contritæ, drachmam, Zingiberis contritæ, Ammoniaci contriti, singulorum drachmas duas, Saponis, drachmas tres, Syrupi, quantum satìs sit;	Take of Squill, recently dried and powdered, a drachm, Ginger, in powder, Ammoniacum, in powder, of each two drachms, Soap, three drachms, Syrup, as much as may be sufficient;
Misce inter se pulveres; deindè cum sapone contunde, et adjice syrupum, ut idonea fiat crassitudo.	Mix the powders with each other, then pound them with the soap and add the syrup, that a proper consistence may be obtained.

These pills are expectorant and diuretic, but when given with either object, they require adjuncts, and the ginger is sometimes objectionable. It is generally supposed that the efficacy of squill is injured by keeping, whence, probably, the Pharmacopœia always directs it to be recently dried: if so, a pill-mass is a bad formula; it is, perhaps, always advisable to recur to extemporaneous prescription, where squill is employed, more especially as it usually requires to be combined with ipecacuanha, calomel, digitalis, emetic tartar, or some other active remedy. From three or four to ten or twelve grains of the above pill twice or thrice a day is used as a warm expectorant.

SCOPARIUS. Broom. *Cacumina recentia.* The fresh tops of the *Cytisus Scoparius. Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Fabaceæ or Leguminosæ.

The common broom is met with in dry sandy thickets, hedges, and fields. It flowers in May and June. It is a large bushy shrub, with long, straight, angular, smooth, dark-green branches; the leaves are deciduous, ternate, small and smooth, the upper ones generally simple. The flowers are axillary, solitary or in pairs, on simple stalks longer than the leaves, large and showy, and of a golden yellow colour. The calyx is bilabiate; the upper lip generally entire, the lower somewhat three-toothed. The stamens are united at the base, and bear oblong yellow anthers. The legume is brown, flat, about an inch long, smooth on the sides, but hairy at the margins. The seeds are compressed and shining, and fifteen or sixteen in number.

Broom-tops have a bitter taste, and are laxative and diuretic; the seeds are emetic, and are said to partake of the poisonous properties of the laburnum seed, (*Cytisus Laburnum*), and to contain *cytisin*. Broom tea, and the ground seed, have long been used as a domestic remedy for dropsy. As the fresh herb only is to be relied upon, the formulæ of the Pharmacopœia are objectionable, and the best mode of using them is to direct an ounce of the green tops to be bruised and boiled in a pint of water down to half a pint. Of this decoction two or three table-spoonsful sweetened with honey, are taken every two or three hours till the bowels are opened.

INFUSUM SCOPARII.	INFUSION OF BROOM.
℞ Scoparii, unciam, Aquæ destillatæ ferventis, octarium;	Take of Broom (fresh tops), an ounce, Distilled Water, a pint;
Macera per horas quatuor, in vase levitèr clauso, et cola.	Macerate for four hours in a lightly-covered vessel, and strain.

This is probably intended as a vehicle for other diuretics.

DECOCTUM SCOPARII COMPOSITUM.	COMPOUND DECOCTION OF BROOM.
℞ Scoparii, Juniperi fructûs, Taraxaci, singulorum unciam dimidiam, Aquæ destillatæ, octarium cum semisse;	Take of Broom (fresh tops), Juniper berries, Dandelion (root), of each half an ounce, Distilled Water, a pint and a half;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

Two or three ounces of this decoction are sometimes taken two or three times daily, as a diuretic, but it is principally useful as a vehicle for squill, or as an auxiliary to other diuretic remedies in the treatment of ascites.

SENEGA, *Radix*. The rood of the *Polygala Senega*. *Cl.* 17. *Ord.* 3. Diadelphia Octandria. *Nat. Ord.* Polygalaceæ.

This plant is a North American perennial, common in the mountainous parts of the United States, where it is known under the name of *Seneka snake root*. Its root sends up several stems about a foot high, erect, slender, round, smooth, and of a reddish colour. The leaves are petiolate, alternate, lanceolate, acute, and pale green; the flowers are small, white, papilionaceous, and in terminal spikes; the calyx is divided into three persistent segments; the capsule is inversely cordate, containing several small seeds.

Senega root is imported from Virginia, in bales of two or three hundred-weight. It is inodorous, pale-brown, and wrinkled; its virtues reside in the exterior cortical portion; the central woody part is inert. Its acrimony manifests itself when chewed, and it promotes a copious flow of saliva. Its infusion reddens litmus, a property depending, according to Peschier, upon the presence of a peculiar acid. According to Gehlen, 100 parts of senega root contain—

Acrid extract (Senegin)	6·15
Bitter resin	7·50
Sweetish extractive	26·85
Gum	9·50
Lignin	46·
	100·

But the latest analysis is by Quevenne (*Journ. de Pharm.* XXII.) who obtained from it the following proximate principles:—

1. Polygalic acid (the Senegin of Gehlen).
2. An oily acid, which he calls Virgineic Acid,
3. Pectic acid,
4. Tannin,
5. Yellow bitter principle,
6. Gum,
7. Albumen,
8. Cerin,
9. Fixed oil.

Senega has been extolled as a powerfully-stimulant diuretic and expectorant, and in large doses is said to vomit and purge; it is, however, one of those numerous articles of the Materia Medica, the use of which is limited to a few individuals who think well of it, whilst it is never prescribed by the generality of practitioners. To promote the separation of the tracheal films of coagulum in croup, a strong decoction of senega, in the proportion of two ounces of the bruised root to a pint of water, is said to have been usefully employed, frequently taken in small quantities into the mouth. As an antidote to the effects of the bite of the rattlesnake, it may possibly be useful where other stimulants are not to be had, especially in its recent state; but where ammonia, ether, brandy, and other analogous remedies, are at hand, senega goes for nothing. Dr. Tennant's reasoning respecting its use in pneumonia, from having observed that pneumonic symptoms followed the bite of the snake, seems hardly admissible. Senega has been highly extolled in a variety of other disorders, in lethargy, rheumatism, scrofula, asthma, as an alterative in cachectic debility, and as a powerful emmenagogue; but the high encomiums bestowed upon it are not borne out by practical experience.

Alcohol is the most effective solvent of the active principle of senega, but the decoction retains its acrimony, and may be used as a vehicle for small doses of the powder, and proper adjuncts. From five to thirty grains of the powder have been given three or four times a day, combined with aromatics, camphor, and occasionally opium, to check the nausea which it is apt to produce.

DECOCTUM SENEGÆ.	DECOCTION OF SENEGA.
℞ Senegæ, drachmas decem,	Take of Senega, ten drachms,
Aquæ destillatæ, octarios duos;	Distilled Water, two pints;
Decoque ad octarium, et cola.	Boil down to one pint, and strain.

From half an ounce to an ounce of this decoction is given as a dose; it is especially commended by Dr. Ives in ascites occurring in phlegmatic habits, and unattended with febrile excitement: the following are formulæ:—

℞ Decocti Senegæ, f℥ss.
Decocti Scoparii compos. f℥j.
Spir. Juniper. compos.
Spir. Ætheris Nitrici, āā fʒj.
M. fiat haustus quartâ quâque horâ sumendus.

℞ Decoct. Senegæ, f℥ij.
Infus. Scoparii, f℥iij.
Tinct. Scillæ, fʒss.
Syrup. Papaver. fʒiij.
M. fiat mistura. Sumatur tertiam partem ter die.

SENNA. *Folia.* The leaves of the *Cassia lanceolata* and *Cassia obovata*. *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Leguminosæ.

The senna of commerce is generally a mixture of the leaves of two or more species of *Cassia* with those of some other plants, and more especially with the leaves of Cynanchum oleæfolium or argel, Tephrosia Apollinea, and Coriaria myrtifolia: to these also the leaves of the Colutea arborescens, and even of Buxus sempervirens, are sometimes superadded.

The species of *Cassia* which yield the genuine senna of commerce are described by Dr. Lindley under the specific names *elongata* and *acutifolia:* they are annuals and natives of Upper Egypt, and of Nubia, and probably of the interior of India. The dried leaves of *C. elongata* are imported from Calcutta under the name of *East Indian senna;* it is called in the Indian bazaars, *Tinnivelly senna*, being cultivated at Tinnivelly on the Malabar coast; it is also called *Senna Mekki*, having been raised in India from Mecca senna seeds.

In the uncertainty which exists respecting the species from which the acute-leaved sennas are obtained, Dr. Lindley takes *C. elongata* as the type, "partly because I happen to have pretty good specimens for description, and partly because it is possibly the same as the common acute-leaved senna of Alexandria altered by climate. I cannot think it the *C. lanceolata* of Forskahl, because it wants the gland upon the petiole of that species, a character of great importance in this genus." The following is his specific description. "It is an annual, but with care may be made to live through the year, and to assume a suffructicose habit. Stem erect, smooth. Leaves narrow, equally pinnated; leaflets four to eight pairs, lanceolate, nearly sessile, slightly mucronulate, smooth above, rather downy beneath, with the veins turning inwards and forming a flexuose, intermarginal line; petioles without glands; stipules softly spinescent, semi-hastate, spreading, minute. Racemes axillary and terminal, erect, stalked, rather longer than the leaves; pedicels without bracts. Sepals linear, obtuse. Petals bright yellow. Of the stamens the five lowest sterile and small, the two next large, curved, and perfect;

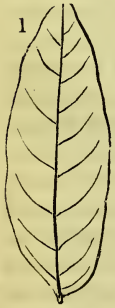
the three uppermost minute and glandlike. Ovary linear, downy, falcate, with a smooth recurved style. Legumes pendulous, oblong, membranous, about an inch and a half long, and five-eighths of an inch broad, quite straight, tapering abruptly to the base, and rounded at the apex, dark-brown, many-seeded."

The *Cassia acutifolia* is a native of Upper Egypt and Nubia, between the Nile and the Red Sea; it furnishes the *Alexandrian senna;* the principal difference between it and the species just described consists in *the legumes being much shorter and rounder.*

In respect to the *Cassia lanceolata*, Dr. Lindley describes it as follows, from a specimen of Arabian plants collected by Dr. S. Fischer, in palm-grounds in the valley of Fatme, flowering in February. "The leaflets are in four or five pairs, never more, oblong, and either acute or obtuse, not at all ovate or lanceolate, and perfectly free from downiness even when young; the petioles have *constantly* a small round brown gland a little above the base. The pods are erect, oblong, tapering in the base, obtuse, turgid, mucronate, rather falcate, especially when young, at which time they are sparingly covered with coarse scattered hairs. The species, therefore, is quite distinct from *Cassia elongata*, and, consequently, excellent as the Tinnivelly senna is, a sort of a still finer quality may be expected from India, as soon as this, the true senna of Mecca, shall have been introduced into the Peninsula."

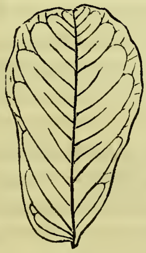
The *Aleppo* and *Italian senna* is the produce of the *Cassia obovata*, found in the high and dry uncultivated lands of Mysore, Egypt, desert of Suez, Nubia, Central Africa, and Cape de Verd. It is a perennial herbaceous plant, with erect, or procumbent smooth stems; leaves equally pinnate, quite smooth, with no gland upon the petiole; leaflets four to six pair, obovate, rounded, but mucronate at the apex, unequal at the base, the uppermost gradually the largest, stipules narrowly triangular, rigid, acute, spreading. Racemes erect, rather lax, axillary, stalked, either longer or shorter than the leaves. Flowers like those of *C. lanceolata.* Legumes oblong, falcate, membranous, smooth, rounded at each end, with an elevated ridge upon the valves over each side, so as to have an equally interrupted ridge along the middle; towards this ridge the veins of each suture are directed nearly at right angles." This yields an inferior kind of senna.

1



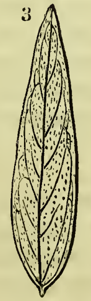
Cassia
lanceolata.

2



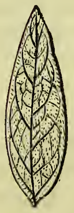
Cassia
obovata.

3



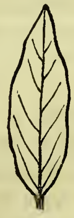
Cassia
elongata.
(Tinnivelly.)

4



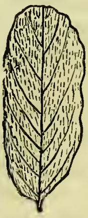
Cassia
acutifolia.

5



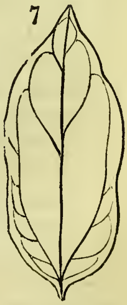
Cynanchum
Argel.

6



Tephrosia
Apollinea.

7



Coriaria
myrtifolia.

The preceding outlines, for which I am indebted to Dr. Lindley, show the forms of the leaves of the above species of senna, and of the plants with which they are commonly or occasionally mixed; the leaves of *Tephrosia Apollinea* are obovate, and somewhat wedge-shaped; those of *Coriaria myrtifolia* ribbed; those of *Cynanchum Argel* pale greenish-yellow, very thick, and veinless.

Qualities of Senna. The characters which should guide us in the selection and purchase of senna, are chiefly a bright fresh colour, and an agreeable smell, somewhat resembling that of tea. It should not be too largely mixed with the above-named adulterations, nor with stalks, seed-pods, and other extraneous matter, nor very much broken, nor very dusty.

Senna has, when chewed, a nauseous and bitterish flavour, peculiar to itself; boiling water dissolves about a third of the weight of the leaves, and affords a brown infusion, nauseous both in smell and taste, and liable to decomposition; it gradually deposits a yellow powder, and is precipitated by the strong acids and by oxalic acid, by the carbonated alkalis and lime-water, by nitrate of silver, by the acetates of lead, by the sulphates of iron, and by many other metallic salts. Proof spirit dissolves a large portion of senna, and forms a brown active tincture. Alcohol and ether yield green solutions.

Senna has been chemically examined by Bouillon la Grange (*Ann. de Chim.* xxxv.), and the effects of various re-agents on infusion of senna have been described by Mr. Battley (*Lond. Med. Rep.* xv. 169). According to Lassaigne and Feneulle, the activity of senna, as a purge, depends upon the presence of a peculiar vegetable principle, which they have termed *cathartine*, and which may be procured as follows:—To an aqueous decoction of senna-leaves add subacetate of lead as long as it occasions a precipitate, which is to be washed, diffused through water, and subjected to a current of sulphuretted hydrogen gas. Separate by filtration, and reject the precipitated hydrosulphuret of lead. Evaporate the clear liquor to dryness, digest the residue in alcohol, and again evaporate to dryness. This alcoholic residue contains acetate of potassa, which may be decomposed by the addition of sulphuric acid, and the sulphate of potassa separated by filtration. Then add acetate of lead to precipitate the sulphuric acid, and pass sulphuretted hydrogen through the liquid; filter, evaporate, and cathartine remains. It is deliquescent, and uncrystallisable, of a reddish colour, a bitter taste, insoluble in ether, but soluble in water and alcohol. (*Ann. de Chim. et Phys.* xvi. 16.)

The other proximate principles of senna-leaves are said to be a little colouring albuminous matter, much mucilage, a fixed and a volatile oil, malic acid and the malates of potassa and lime, chloride of potassium, the sulphates carbonates and subphosphates of potassa and of lime, silica, and lignin.

Senna is a valuable purgative remedy, but it is very rarely employed alone, from its tendency to gripe and produce spasmodic pains and flatulency: in conjunction with, and as an auxiliary to other aperients and purgatives, it is in constant use, and many such mixtures clear the bowels with speed and certainty. The following are the officinal formulæ of senna in the *London Pharmacopœia:*—

INFUSUM SENNÆ COMPOSITUM.	COMPOUND INFUSION OF SENNA.
℞ Sennæ, drachmas quindecim,	Take of Senna, fifteen drachms,
Zingiberis concisæ, scrupulos quatuor,	Ginger, sliced, four scruples,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horam, in vase levitèr clauso, et cola.	Macerate for an hour in a lightly-covered vessel, and strain.

TINCTURA SENNÆ COMPOSITA.	COMPOUND TINCTURE OF SENNA.
℞ Sennæ, uncias tres cum semisse,	Take of Senna, three ounces and a-half,
Carui contusi, drachmas tres cum semisse,	Caraways, bruised, three drachms and a-half,
Cardamomi contusi, drachmam,	Cardamoms, bruised, a drachm,
Uvæ, uncias quinque,	Raisins, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and strain.

The *infusion* and *tincture* are the most useful and generally employed preparations of senna, and are prescribed together, or separately, chiefly in conjunction with saline purgatives, and with other aperients; the usual dose of the infusion being from one to two ounces, and of the tincture from one to three or four drachms. The infusion of senna is rendered more agreeable, and less apt to decompose, by substituting a drachm of bruised cloves for the ginger. In the tincture, liquorice root is a good substitute for the raisins. One of the many forms of the ordinary *black dose* has been already given (page 349); the following are analogous formulæ, and may either be used alone or as cleansers after calomel purgatives:—

℞ Potassæ Tartratis, ʒj.
Infus. Sennæ compos.
Aquæ Pimentæ, āā fʒvj.
Tinct. Jalapæ, fʒj.
M. fiat haustus laxans.

℞ Infus. Sennæ, f℥iv.
Magnes. Sulphatis, ℥j.
Aquæ Menthæ sativ. f℥ij.
Tincturæ Senn, f℥ss.
M. sumat cochlear. iv. mane primo et repet. post horas tres, si opus sit.

The addition of syrups to these combinations renders them to most palates more nauseous, without aiding their efficacy; half an ounce of manna is, however, occasionally added to the above mixture. As a purge in gouty habits, from half an ounce to an ounce of tincture of senna is not unfrequently prescribed, with an ounce or two of peppermint or of mint water; a purgative which has gained some celebrity under the name of *gout cordial*, is a mixture of equal parts of the tinctures of senna, rhubarb, and aloes; it is usually sweetened with sugar candy.

SYRUPUS SENNÆ.	SYRUP OF SENNA.
℞ Sennæ, uncias duas cum semisse,	Take of Senna, two ounces and a-half,
Fœniculi contusi, drachmas decem,	Fennel (seed), bruised, ten drachms,
Mannæ, uncias tres,	Manna, three ounces,
Sacchari, uncias quindecim,	Sugar, fifteen ounces,
Aquæ ferventis, octarium;	Boiling Water, a pint;

Sennam et fœniculum in aquâ macera leni calore per horam. Liquori colato mannam et saccharum immisce; dein decoque ad idoneam crassitudinem.

Macerate the senna and fennel in the water, with a gentle heat, for an hour. Mix the manna and the sugar with the strained liquor; then boil down to a proper consistence.

This syrup is intended as a purgative for children, the dose being from two to four drachms.

CONFECTIO SENNÆ.

℞ Sennæ, uncias octo,
Ficorum, libram,
Tamarindi,
Cassiæ,
Prunorum, singulorum libram dimidiam,
Coriandri, uncias quatuor,
Glycyrrhizæ, uncias tres,
Sacchari, libras duas cum semisse,
Aquæ, octarios tres;

Sennam cum coriandro tere, et cribro separa pulveris misti uncias decem. Tum aquam cum ficis et glycyrrhizâ adjectam ad dimidium decoque; deindè exprime, et cola. Liquorem colatum balneo aquoso consume, donec fluidunciæ viginti quatuor ex toto restent; tum, adjecto saccharo, fiat syrupus. Denique cum syrupo pulpas paulatim contere, et, injecto pulvere cribrato, omnia misce.

CONFECTION OF SENNA.

Take of Senna, eight ounces,
Figs, a pound,
Tamarind pulp,
Cassia pulp,
Prunes pulp, each half a pound,
Coriander, four ounces,
Liquorice, three ounces,
Sugar, two pounds and a-half,
Water, three pints;

Rub the senna with the coriander, and separate by a sieve ten ounces of the mixed powder. Then boil down the water with the figs and the liquorice added, to one half, and press out and strain the liquor. Evaporate the strained liquor in a water-bath, until of the whole, twenty-four fluid ounces remain; then let it be made into a syrup, with the addition of the sugar. Lastly, rub the pulps gradually with the syrup, and having added the sifted powder, mix them all.

This, which is the *Lenitive Electuary* of former Pharmacopœiæ, is an agreeable and useful aperient, though it is apt to ferment in warm weather and sometimes gripes when given alone. It is a good vehicle for the exhibition of some of the more powerful cathartics. The dose is from two to four or six drachms: when the bowels are sluggish, or where it is required to keep them more than usually active, a tea-spoonful may be taken every morning, or night and morning, as occasion may require. The preparation of this electuary, according to the above formula, is tiresome and expensive, and there are many temptations to sophistication. Dr. Paris says, that jalap, blackened with walnut liquor, is frequently substituted for the pulp of cassia; and that the great bulk of it sold in London is little else than prunes, figs, and jalap. He adds, "I understand that a considerable quantity is also manufactured in Staffordshire, in which unsound and spoilt apples enter as a principal ingredient. The preparation sold at Apothecaries' Hall is certainly unique in excellence."

SERPENTARIA. *Radix.* Virginia snake-root. The root of *Aristolochia Serpentaria. Cl.* 20. *Ord.* 4. Gynandria Hexandria. *Nat. Ord.* Aristolochiaceæ.

The term *Aristolochia* is derived from the virtue attributed to these plants of cleansing the lochia after child-bearing; hence the English name *birthwort*, by which the only British species, the *A. clematitis*, is distinguished. The *A. Serpentaria* is a native of the woods in the southern and middle parts of the United States. It has a perennial fibrous root, of a brown colour, attached to a horizontal caudex, from which several slender stems arise, crooked and jointed, and less than a foot high. Leaves alternate, on short petioles, cordate, entire, pointed, three-nerved, yellowish-green. The flowers grow close to the ground. The calyx consists of a contorted tube, swelling at its extremities, having its throat surrounded by an elevated brim, and its border expanded into a broad margin, forming an upper and under lip, closed in a triangular manner in the bud. The twelve anthers grow in pairs to the sides of the fleshy style, which is situated in the bottom of the calyx, and covered by a convoluted stigma which extends over the anthers. The capsule is obovate, six-celled, with numerous flat small seeds.

Dried serpentaria root is imported in bales of three or four hundredweight each; it is generally extremely foul, and often mixed with roots of *Collinsonia præcox*. The cleanest, freshest, and largest roots, and those which have the peculiar aromatic odour in the greatest perfection, are to be preferred; they have a pungent, bitterish flavour.

According to Bucholz, serpentaria root contains—

Volatile oil	0·50
Bitter extractive	4.20
Gummy extractive	18·10
Greenish resin	2·38
Water	14·48
Lignin	60·34
	100

It has also been analysed by Chevalier (*Journ. de Pharm.*), who obtained from it volatile oil, starch, resin, gum, albumen, a yellowish bitter acrid substance soluble in alcohol and water, malate and phosphate of potassa and of lime, iron, and silica.

Serpentaria is a stimulating tonic and diaphoretic, useful in idiopathic and exanthematous fever of the typhoid character, in which it may be conjoined with cinchona; it is a good stomachic tonic in some forms of dyspepsia; it is occasionally used as a gargle in putrid sore throat; it is much less used with us than in Germany, where it is commonly prescribed as a tonic in cases of convalescence, where such are indicated, and especially where nervous debility has been predominant. The dose of the powdered root is from five to twenty, or even thirty grains, twice or thrice a day. An infusion (which should be double the strength of that of the Pharmacopœia) is a good form for its administration, in the dose of an ounce or an ounce and a half, to which a drachm of the tincture may be added.

INFUSUM SERPENTARIÆ.	INFUSION OF SERPENTARIA.
℞ Serpentariæ, semunciam,	Take of Serpentaria (root, bruised) half an ounce,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horas quatuor, in vase levitèr clauso, et cola.	Macerate for four hours in a lightly-covered vessel, and strain.

Tinctura Serpentariæ.	Tincture of Serpentaria.
℞ Serpentariæ contusæ, uncias tres cum semisse,	Take of Serpentaria, bruised, three ounces and a-half,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

SEVUM. Mutton suet.

This is one of the hardest varieties of fat; it is used to give consistency and greasiness to some ointments and plasters.

SIALAGOGUES (σιαλον, *saliva.* and αγω, *I expel*). Remedies which excite an uncommon flow of saliva; they either act topically, as *pyrethrum*, *senega*, &c., or constitutionally, as *mercury*.

SILVER, *see* Argentum.

SIMARUBA. *Radicis Cortex.* The bark of the root of *Simaruba officinalis. Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Simarubaceæ (*Simaruba amara*).

This tree, which attains the height of sixty feet, is a native of moist sandy places in Guyana and Cayenne, and common on the Port Royal mountains, Jamaica. It has long creeping roots; leaves alternate, pinnated; leaflets alternate, two to nine on each side, oval, smooth, firm, mucronate; petiole of the largest leaves fourteen inches long; flowers some male, some female, mixed upon branched scattered panicles, very small; petals stiff, sharp-pointed, whitish, fixed between a membranous disk and the calyx. Filaments each arising out of a small, rounded, velvety scale. Capsules five, ovate, blackish, disjoined, placed on a fleshy disk with a fleshy pericarp.

Simaruba bark is imported in bales chiefly from Jamaica; it is generally in narrowish strips, several feet in length, and folded lengthwise. It is usually of a dirty buff colour, rough, and extremely fibrous, and is often presented for sale dirty and dusty, and apparently spoiled by keeping; it is inodorous and bitter, and contains, according to Morin and Rouen (*Journ. de Pharm.*, 1822), a peculiar bitter principle, which they term *quassina*, together with a volatile oil having a benzoic odour, resin, gallic acid, malic acid, malate and oxalate of lime, acetate of potassa, an ammoniacal salt, oxide of iron, and alumina.

Simaruba is occasionally prescribed in diarrhœa depending upon dyspepsia; it has, however, nothing to recommend it in preference to the numerous analogous articles of the Materia Medica: some have praised it in intermittent fever, and it has been celebrated as a remedy for dysentery, but it is a drug of questionable utility. The dose of powdered simaruba is from ten to thirty grains, but it is more usually given in the form of decoction or infusion.

Infusum Simarubæ.	Infusion of Simaruba.
℞ Simarubæ contusæ, drachmas tres,	Take of Simaruba, bruised, three drachms,
Aquæ destillatæ ferventis, octarium;	Boiling distilled water, a pint;
Macera per horas duas, in vase levitèr clauso, et cola.	Macerate for two hours in a lightly-covered vessel, and strain.

SINAPIS. *Semina.* Black Mustard Seed. The seed of *Sinapis nigra.* *Cl.* 15. *Ord.* 2. Tetradynamia Siliquosa. *Nat. Ord.* Brassicaceæ, or Cruciferæ.

The mustard plant is a common annual, found in fields and waste places over a great part of Europe. It is cultivated for domestic use. It flowers in June, attaining the height of two to three feet; it has a small root. Its lower leaves are large, lyrate, rough, lobed, toothed; the upper narrow, stalked, and smooth. Calyx yellowish, spreading. Petals yellow, obovate; pods small, bluntly quadrangular, nearly even, and smooth, pressed close to the peduncle; tipped by a small short style, but destitute of the long beak of other species. Seeds blackish-brown, veined, round.

For domestic use, and for most medical purposes, the seeds of the above, and of the *Sinapis Alba*, or white (yellow) mustard, are either mixed or used indiscriminately; the black seed is, however, the more pungent. It has scarcely any odour till bruised, when it becomes pungent; its taste is acrid and biting. It yields, on pressure, about eighteen per cent. of a yellow, bland, inodorous, fixed oil, which is aperient in large doses, thicker than olive oil, and of specific gravity 0·917. It is soluble in ether and in anhydrous alcohol, and is occasionally used in the manufacture of soap. White mustard seed yields nearly double the quantity of a similar oil. When the mark, after the expression of the fixed oil, is distilled with water, a volatile oil, of a strong and penetrating odour, passes over, which does not exist ready formed in the seed, but is a result of the action of water, analogous to that by which the oil of bitter almonds is formed. The specific gravity of this oil, at 68°, is 1·015; its boiling point, 290°. It is soluble in alcohol and ether, and, aided by heat, is a good solvent of sulphur and phosphorus. The specific gravity of its vapour is 3·40. It is energetically acted upon by nitric acid, and one of the products is sulphuric acid. It absorbs ammonia, and produces with it a crystalline compound. The ultimate elements of this oil are very remarkable, being, according to the analysis of Dumas and Pelouze (*Ann. de Chim. et Phys.* LIII.)—

Carbon	49·53
Hydrogen	5·02
Oxygen	11·74
Nitrogen	13·45
Sulphur	20·26
	100·00

The large proportion of sulphur, as well as of nitrogen, in this oil, are striking peculiarities, and lead to some curious questions, both as to the original source of the former in the plant itself, and to the state of combination in which it exists in the seed. The terms *sinapin* and *sulphosinapisin* have been applied to this oil.

The uses of mustard as a stimulating condiment are well known; it is also diuretic, emetic, and rubefacient, or vesicant.

The bright yellow powder, sold under the name of *flour of mustard*, and used at the table, is a compound of powdered black and pale mustard seed, cayenne pepper, wheat flour, and turmeric.

Mustard whey is sometimes used to promote the secretion of urine in dropsies; it is made by boiling half an ounce of bruised mustard seed in a pint of milk, and straining it to separate the curd; of this a fourth part is taken three or four times a day. In the dose of about two drachms, the bruised or powdered seed is emetic; it may be taken in a wine-glassfull of water, and its operation promoted in the usual way. It will sometimes operate in cases of apoplexy or palsy, when other remedies fail. A few years ago, white mustard seed was a favourite remedy in dyspepsia, chlorosis, and many of those anomalous nervous complaints to which females in the higher ranks of life are especially subject: it was swallowed whole, to the amount of three or four table-spoonsfull daily; but cases of its lodgment in the large intestines, and of fatal ulceration having occurred from such absurd and improper employment of it, it has of late fallen into disuse.

As an external irritant and vesicant, mustard poultices, or *sinapisms*, are not unfrequently substituted for blisters, especially with a view of causing a counter-irritation, or revulsion, in a remote part of the body, in cases of coma and delirium; hence the application of sinapisms to the calves of the legs and soles of the feet: but these cataplasms should not be indiscriminately or incautiously applied, for they sometimes induce troublesome ulceration, and even gangrene.

Cataplasma Sinapis.	Cataplasm of Mustard.
℞ Lini seminum,	Take of Linseed,
Sinapis, singulorum contritorum, libram dimidiam,	Mustard seed, of each, powdered, half a pound,
Aceti fervefacti quantum satis sit, ut fiat cataplasmatis crassitudo;	Boiling hot vinegar, as much as may be sufficient to produce the consistency of a cataplasm.
Misce.	Mix them.

SOAP, *see* Sapo.

SODA. Oxide of Sodium. *Natron.* *Mineral alkali.*

The demands for this important alkali were formerly almost exclusively supplied from Spain, Sicily, and Teneriffe, where a very impure carbonate of soda was prepared by burning certain plants, more especially the *Salsola soda*, which was largely cultivated for the purpose upon the coast of the Mediterranean. This substance, called *Barilla*, was imported from Spain and purified in this country. Of late, carbonate of soda has been most extensively and successfully manufactured in this country from common salt, which is converted by the action of sulphuric acid into sulphate of soda, and this decomposed by calcination with lime and coal, so as ultimately to form a carbonate (see *Manual of Chemistry*).

Pure or caustic soda is obtained from carbonate of soda by the action of quick lime, exactly as potassa is procured from carbonate of potassa, but it is not used in medicine. It may be decomposed by processes similar to those resorted to for the decomposition of potassa.

Sodium is a soft malleable metal, of a brilliant silvery hue, but instantly tarnishes on exposure to air. Its specific gravity is about 0·672. It fuses at 190°; and is volatile at a white heat. When heated a little above its fusing point, it takes fire and burns into soda, or oxide of sodium, which consists of—

	Atoms.	Equivalents.	Per Cent.
Sodium	1	24	75
Oxygen	1	8	25
Soda	1	32	100

Soda, like potassa, is usually met with in the state of hydrate, constituting what is termed pure or caustic soda, and containing—

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	78·1
Water	1	9	21·9
Hydrate of Soda	1	41	100·0

The officinal preparations of soda, included in the *London Pharmacopœia*, are the following:—

*Sodæ Carbonas Impura.
Sodæ Carbonas.
Sodæ Carbonas exsiccata.
Sodæ Sesquicarbonas.
Liquor Sodæ effervescens.
Liquor Sodæ Chlorinatæ.
*Sodii Chloridum.
Sodæ Sulphas.
*Sodæ Phosphas.
Sodæ Potassio-tartras.
*Sodæ Acetas.

Of these compounds, those marked with asterisks are placed among the articles of the Materia Medica, formulæ being given for the preparation of the others.

SODÆ CARBONAS.	CARBONATE OF SODA.
℞ Sodæ Carbonatis impuræ, libras duas, Aquæ destillatæ, octarios quatuor; Coque sodæ carbonatem impuram in aquâ, et adhuc calidam cola. Denique sepone ut fiant crystalli.	Take of impure Carbonate of Soda, two pounds, Distilled Water, four pints; Boil the impure carbonate of soda in the water, and strain whilst hot. Lastly set aside, that crystals may be formed.
NOTA.	NOTE.
SODÆ CARBONAS (*crystalli*). Recèns præparata translucet, sed in vase aperto in pulverem mox fatiscit. In aquâ tota liquatur, non verò in alcohole. Curcumæ colorem, ut alkalina, mutat.	CARBONATE OF SODA (*crystals*). Recently prepared, it is translucent, but in an open vessel it soon falls into powder. It is entirely soluble in water, but not in alcohol. It changes the colour of turmeric, like alkalis.

The carbonate of soda of commerce, as now prepared by the wholesale manufacturers, is so nearly pure, that the above simple process is quite sufficient to render it fit for medical uses; it forms efforescent crystals, resulting from a primary oblique rhombic prism. It is soluble in about twice its weight of cold water, and the solution tastes and reacts alkaline. It consists of—

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	22·25
Carbonic Acid	1	22	15·25
Water	10	90	62·50
Crystallised Carbonate of Soda	1	144	100·00

When the crystallised carbonate is exposed to heat it readily fuses, and, at a red heat, it loses the whole of its water of crystallisation, as in the following formula, and remains in the form of an opaque, white, porous, and pulverulent mass.

SODÆ CARBONAS EXSICCATA.	DRIED CARBONATE OF SODA.
℞ Sodæ Carbonatis, libram;	Take of Carbonate of Soda, a pound;
Sodæ carbonati in vase idoneo calorem adhibe, donec exsiccetur, eamque posteà usque ad rubedinem ure. Denique in pulverem tere.	Expose the carbonate of soda to heat, in a proper vessel, till it is dried, and afterwards heat it to redness. Lastly, reduce it to powder.
NOTA.	NOTE.
SODÆ CARBONAS EXSICCATA. In hoc sale exsiccando, crystallorum suprà descriptarum partes 100 aquæ partes 62 emittunt in igne acri. Cætera nihil mutantur.	DRIED CARBONATE OF SODA. In drying this salt, 100 parts of the crystals above described lose 62 of water, in a strong fire. In other respects it is unchanged.

The anhydrous salt consists of—

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	59·25
Carbonic Acid	1	22	40·75
Anhydrous Carbonate of Soda	1	54	100·00

SODÆ SESQUICARBONAS.	SESQUICARBONATE OF SODA.
℞ Sodæ Carbonatis, libras septem,	Take of Carbonate of Soda, seven pounds,
Aquæ destillatæ, congium;	Distilled Water, a gallon;
Sodæ carbonatem in aquâ liqua, et cola; dein acidum carbonicum per liquorem transmitte usque ad saturationem ut subsidat sal. Hunc in linteo involutum et compressum, leni calore exsicca.	Dissolve the carbonate of soda in the water, and filter; then transmit carbonic acid through the solution till it is saturated, that the salt may subside. Dry this, wrapped in linen and pressed, by a gentle heat.
NOTA.	NOTE.
SODÆ SESQUICARBONAS. In aquâ tota liquatur. Ex hoc liquore, nec platini chloridum neque magnesiæ sulphas, nisi calore admoto, quicquam demittit. Igne acri in sodæ carbonatem exsiccatam convertitur.	SESQUICARBONATE OF SODA. It is entirely dissolved by water. Nothing is thrown down from this solution either by chloride of platinum, or by sulphate of magnesia, unless heat be applied. By a strong fire it is converted into dry carbonate of soda.

Remarks (PHILLIPS). "If it contain any salt of potash, chloride of platina would precipitate a double salt of potassium and platina. The aqueous solution acts but slightly on turmeric paper. If it do not contain the proper quantity of carbonic acid, it will precipitate sulphate of magnesia without the application of heat. By exposure to a strong heat, it loses one-third of its carbonic acid, and all its water."

In the above process, a bicarbonate of soda is probably at first precipitated, which, during the process of drying "with a gentle heat," loses a portion of its carbonic acid, so as to remain chiefly in the state of sesquicarbonate. When the salt which falls during the passage of a current of carbonic acid through a strong solution of carbonate of soda is washed with cold water, and rendered as dry as possible by strong pressure, it contains a large relative proportion of bicarbonate. According to Mr. Pereira, "the so-called sesquicarbonate of soda of the shops, usually, if not invariably, contains carbonate and bicarbonate of soda; these may be detected as follows:—Wash with a small quantity of distilled water, and filter; the solution contains carbonate of soda (known by its throwing down a brick-dust-red precipitate on the addition of bichloride of mercury), while there remains on the filter bicarbonate of soda, (recognised by its causing a white precipitate, or a slight milkiness or opalescence, with bichloride of mercury.) The relative proportions of carbonate and bicarbonate of soda are not constant."

Native carbonate of soda occurs in considerable abundance in Africa, near Fezzan; in Maracaybo, one of the provinces of Venezuela, in South America; and also in the soda lakes of Hungary. This has been shown by Mr. Phillips to be a true *sesquicarbonate*, and, according to him, the salt prepared according to the above directions of the Pharmacopœia, is similarly constituted, and consists of—

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	38·6
Carbonic Acid	1½	33	39·8
Water	2	18	21·6
Sesquicarbonate of Soda	1	83	100·0

The sesquicarbonate of soda is much less soluble in water than the carbonate. According to Rose, the bicarbonate of soda requires no less than thirteen parts of water at 60° for its solution. When the bicarbonate of soda is boiled with water, it loses carbonic acid, and then becomes a sesquicarbonate.

LIQUOR SODÆ EFFERVESCENS.

℞ Sodæ Sesquicarbonatis, drachmam,
Aquæ destillatæ, octarium;

Sodæ carbonatem in aquâ liqua, eique acidi carbonici, vi compressi, immitte plusquam satis sit ad saturationem. Liquorem in vase bene obturato serva.

NOTA.

SODÆ CARBONATIS LIQUOR EFFERVESCENS. Lacmi color cœruleus in hoc liquore principio rubescit, mox calore adhibito, ubi cessaverit effervescentia, idem redit.

EFFERVESCING SOLUTION OF SODA.

Take of Sesquicarbonate of Soda, a drachm,
Distilled Water, a pint;

Dissolve the carbonate of soda in the water, and pass into it, compressed by force, more carbonic acid than is sufficient for saturation. Keep the solution in a well-stopped vessel.

NOTE.

EFFERVESCING SOLUTION OF CARBONATE OF SODA. The blue colour of litmus is at first reddened in this solution, but it is afterwards restored, on the application of heat, when the effervescence has ceased.

This seems an unnecessary formula, in consequence of the abundance and excellence of the supply of *soda water* by the wholesale manufacturer.

Medical Uses of the Carbonates of Soda.—Pure soda is scarcely ever prescribed medicinally; it might be, and, by some practitioners, is used, as a substitute for pure potassa, but there appears no good reason for the preference. The carbonates of soda are, however, upon the whole, preferable as antacids, lithontriptics, and alteratives, to the carbonates of potassa; they are less unpleasant to the palate, and seem, in many cases at least, to agree better with the stomach. From ten to thirty or forty grains of the crystallised carbonate of soda may be given twice or thrice a day, in an ounce and a half of almond mixture, where the object is to correct a red sediment and acid state of the urine; or in cases of acidity of the stomach, flatulency, and other dyspeptic symptoms, it may be given with bitters, in some such form as the following:—

℞ Sodæ Carb. ℈j.
Infus. Gentianæ compos.
Aquæ Pimentæ, āā f℥vj.
Tinctur. Lupuli, f℥j.
M.

Like other alkalies, if given in too large or continuous doses, it occasions a film of ammonia-magnesian phosphate, or a deposit of white sand composed of it and of phosphate of lime, in the urine. Two drachms, taken in the morning upon an empty stomach, in a large cup of tea, produced a sensible effect on the urine voided ten minutes afterwards, and in two hours the urine became opalescent and alkaline.

Carbonate of soda, in large doses, has been recommended in *tic douloureux*, but the remedy is uncertain. It has gained some confidence in the treatment of scrofula, and has been supposed to confer upon burnt sponge its chief efficacy; but there, iodine is probably the beneficial agent. The alkaline carbonates are, however, no doubt effective alteratives in some forms of scrofulous diathesis.

The dried carbonate of soda is of course effective in much smaller doses than the crystals; one part of it may generally be considered as equivalent to two, or somewhat more, of the common crystallised carbonate. It is especially useful as an ingredient in powders and pills, and not being deliquescent, as is the case with carbonate of potassa, there is no inconvenience from its exposure to air. The following, and similar formulæ, may be used in cases of dyspeptic acidity:—

℞ Sodæ Carbonatis exsicc.
Extracti Rhei.
Extracti Gentianæ, āā, ℈j.
Fiat massa in pilulas xij. dividenda quarum sumantur duæ bis die.

℞ Sodæ Carbon. exsicc. gr. x.
Pulver. Rhei.
Pulv. Cinnam, āā gr. v.
Fiat pulvis ante prandium sumendus, et vespere si opus sit.

The following are antacid stomachic powders, taken with advantage at bed-time, to prevent the ill effects of too much meat and drink upon a gouty or dyspeptic habit:—

℞ Sodæ Carb. exsiccat.
Magnes. Carbon.
Cretæ Preparatæ,
Pulv. Calumbæ, āā gr. x.
Pulv. Cinnamomi, gr. v.
M. fiat pulvis horâ somni sumendus è cyatho aquæ.

℞ Sodæ Carbonatis,
Magnesiæ Carbonatis,
Pulver. Flor. Anthemid. āā gr. x.
M.

By supersaturation with carbonic acid, as in *soda water*, and in the *Liquor Sodæ Effervescens*, the nauseous alkalinity of carbonate of soda is concealed, and its powers as an antacid and lithontriptic, though considerably modified, are not materially impaired: it must, however, be recollected, that much of what is sold under the name of *soda water*, is merely water highly impregnated with carbonic acid, and that its effects, especially as a lithontriptic, are accordingly inverted. By some manufacturers soda water is faithfully prepared of single, double, and treble strength, containing, in the half-pint bottle, half a drachm, one drachm, and one drachm and a-half of the crystallised carbonate, duly supersaturated with carbonic acid.

The *sodaic powders*, sold as a substitute for soda water, consist of sesquicarbonate of soda and tartaric acid; about thirty grains of each being usually put up in separate papers, and directed to be mixed in a half-pint tumbler of water: this forms a pleasant effervescing draught, and containing tartrate of soda, it is slightly aperient, but different in composition and effect from genuine soda water; like the other salts of vegetable acids with alkaline bases, however, its operation upon the urine is that of an antacid, and much mischief occasionally results from the superabundant and incautious use of beverages of this kind, as well as of soda water; they seem, in some cases, to modify, dilute, or even dissolve the protecting secretion of the inner coat of the bladder, and probably, also, of the kidneys and ureters.

SODII CHLORIDUM. Chloride of Sodium. *Common Salt. Sea Salt. Muriate of Soda.*

This important compound is contained in enormous quantity in the water of the ocean, and in many springs (*brine springs*), it also occurs as a mineral product (*rock salt*) in the transition and newer rocks; in this country, especially, in the new red sand-stone. From the latter sources (the brine-springs and salt rock of Cheshire, Worcestershire, and Staffordshire), the demands of this country are chiefly supplied; large quantities of salt are also procured by the evaporation of sea-water.

Chloride of sodium crystallises in cubes, which are anhydrous, of a pure saline taste, and not deliquescent; thrown upon the fire, it crackles or decrepitates, partly in consequence of the expansive action of heat upon its exterior, and sometimes from the presence of interstitial moisture. At a bright red heat it fuses, and slowly sublimes. It requires nearly three parts of water, at 40°, for solution, and is scarcely more soluble in hot than in cold water. According to Gay Lussac, 100 parts of water, at 58°, dissolve 36 parts of salt; at 140° 37 parts; and at 225°, which is the boiling point of a saturated solution, 100 parts of water hold 40·38 of salt in solution. At 32° water dissolves as much, or rather more, than at 60°. Salt consists of—

	Atoms.	Equivalents.	Per Cent.
Sodium	1	24	40
Chlorine	1	36	60
Chloride of Sodium	1	60	100

The manner in which chloride of sodium is decomposed by the action of hydrated sulphuric acid, and the theory of the production of hydrochloric acid, and of soda, has been already explained (*see* Hydrochloric Acid, page 301).

Salt is a universal favourite with man and many other animals, and is in constant use as a condiment and seasoner of our food. The part which it performs in the animal economy is not distinctly understood, but is, no doubt, highly important, if not essential, to its healthy functions; it is true, there are persons who care little for salt, and seldom eat it at their meals; but there is scarcely any dish brought to table, of which salt does not already form an ingredient, or to which it has not been intentionally added. Its presence in the blood and the secretions is extremely characteristic, and it is said that persons who habitually abstain from salt are subject to glandular affections, and more especially to intestinal worms. Dr. Stevens's discoveries regarding the influence of salt upon the colour of the blood, and his speculations respecting the physiological influence of the saline qualities of the blood, together with the experiments which have been made upon the injection of solutions of salt into the veins, have of late years added much to the interest with which salt may be regarded as a therapeutic agent.

When salt is used in moderate quantity, it not only gratifies the palate, but promotes digestion; in larger proportion it excites thirst, increasing at the same time the secretions from the skin, bowels, and kidneys. With many persons it manifestly contributes to the regular action of the bowels, and prevents flatulency and eructation. From the constant presence of hydrochloric acid in the gastric secretion, and of soda in the blood, it has been presumed that salt is in some way decomposed so as to supply the acid and the alkali, but of this we have no direct proof.

When persons are continuously fed upon highly salted provisions, they gradually become unhealthy, and a variety of morbid symptoms ensue, constituting the disease called *scurvy*, a disease formerly prevalent in the navy, but which has of late years greatly diminished in consequence of improvements in the art of preserving food, and in regulating the whole of the diet of seamen. The disease probably arises partly from the continued stimulation of the excess of salt, and partly, if not principally, from the changes which the salted articles undergo in consequence of the long-continued action of the brine.

When two or three table-spoonsfull of salt are dissolved in half a pint or a pint of warm water, and swallowed at a draught, it excites nausea, and, generally, vomiting, and promotes the action of the bowels. In malignant cholera, this has been recommended in preference to other emetics, and it has been found useful in cases of narcotic and other poisoning, as a remedy easily procurable. Its efficacy is increased by the addition of a tea-spoonfull of flour of mustard.

In what has been termed the *saline treatment* of cholera, common salt forms an essential feature; in that disease the blood is black, and deficient in saline contents, and as the property of neutral salts is to render the blood florid, their use, thus theoretically indicated, has been found practically beneficial. The following are the *saline formulæ* recommended in these cases by Dr. Stevens and Dr. O'Shaughnessy:—

Take of Carbonate of Soda, half a drachm,
Chloride of Sodium, a scruple,
Chlorate of Potassa, seven grains;
To be dissolved in four or five ounces of water, and taken at intervals of from fifteen minutes to an hour, being given more or less frequently, according to the circumstances of the case, and continued till the circulation is fairly restored.

Take of Phosphate of Soda,
Chloride of Sodium,
Sulphate of Soda, of each, ten grains;
Carbonate of Soda, five grains;
Dissolved in six ounces of water, and taken every two hours.

With this treatment, saline enemata and salt baths are occasionally conjoined, and some have been bold enough to resort also to the injection of saline solutions into the veins, and this to a most daring extent: with what success, or how far such extraordinary means are justifiable, will appear from the following statement, as given by Mr. Pereira (*Elements of Materia Medica*, part I., 313). "This plan was, I believe, first practised by Dr. Latta (*Med. Gaz.*, x., 257). The quantity of saline solution which has been in some cases injected, is enormous, and almost incredible. In one case, 120 ounces were injected at once, and repeated to the amount of 330 ounces in twelve hours. In another, 376 ounces were thrown into the veins, between Sunday, at eleven o'clock A.M., and Tuesday, at four P.M.; that is, in the course of fifty-three hours, upwards of 31 pounds. The solution used consisted of two drachms of muriate, and two scruples of carbonate of soda to sixty ounces of water. It was at the temperature of 108°, or 110° Fahr. In another series of cases, 40 pounds were injected in twenty hours; 132 ounces in the first two hours; 8 pounds in half an hour! The *immediate* effects of these injections, in a large majority of cases, were most astonishing; restoration of pulse, improvement in the respiration, voice, and general appearance, return of consciousness, and a feeling of comfort. *In many instances, however, these effects were only temporary, and were followed by collapse and death.*"

The reports as to the ultimate benefit of this treatment in cholera, are so contradictory, that it is difficult to form a correct estimate of it. "That it failed in a large proportion of cases after an extensive trial, and greatly disappointed some of its stanchest supporters, cannot be doubted. Dr. Griffin states that all the published cases of injection which he can find recorded, amount to 282, of which 221 died, while 61 only recovered; but he thinks that the average recoveries from collapse by this method of treatment, far exceeded the amount of any other treatment in the same district and under the same circumstances." (*Med. Gaz.*, XXII., 319.)

A draught of salt water taken in the morning fasting, has been successfully resorted to as a remedy for worms; even the tape-worm has been thus expelled; practitioners, however, generally resort to more effective anthelmintics.

As an *external application*, salt and water will sometimes disperse indolent glandular tumours and wens; a piece of flannel moistened with brine, should, in such cases, be kept continually on the part.

Sea water contains between three and four per cent. of saline matter, two-thirds of which is common salt. The specific gravity of sea water varies from 1026 to 1030. Its principal contents are chloride of sodium, chloride of magnesium, sulphate of magnesia, and sulphate of lime; these, at least, are the chief results of its evaporation; but how the respective elements are actually combined in the original water seems somewhat doubtful, except, perhaps, as regards the chloride of sodium. The other saline substances present are traces of chloride of potassium, of double sulphate of magnesia and potassa, and of iodine and bromine (iodide and bromide of magnesium?) Sea water is a good external stimulant, and when used as a bath, is more agreeable in its reaction than plain water. Much of the benefit derived from sea-bathing, and especially from hot salt-water baths, is to be ascribed to its action as a cuticular stimulant.

LIQUOR SODÆ CHLORINATÆ.

℞ Sodæ Carbonatis, libram, j.
Aquæ destillatæ, fluiduncias quadraginta octo,
Sodii Chloridi, uncias quatuor,
Manganesii Binoxydi, uncias tres,

Acidi Sulphurici, uncias quatuor;

Sodæ carbonatem in aquæ octariis duobus liqua; tum sodii chloridum et manganesii binoxydum in pulverem contritum in retortam immitte; iisque adjice acidum sulphuricum aquæ fluidunciis tribus priùs mixtum et frigefactum. Calefac et chlorinium primùm per aquæ fluiduncias quinque deindè per sodæ carbonatis liquorem suprà præscriptum transmitte.

NOTA.

SODÆ CHLORINATÆ LIQUOR. Curcumæ color in hoc liquore principio in fuscum mutatur, mox omnis perit. Acido hydrochlorico diluto adjecto, acidum carbonicum et chlorinium simul emittit; liquor sulphatis indigo ab hoc decoloratur; calx è liquore calcis ab illo dejicitur.

SOLUTION OF CHLORINATED SODA.

Take of Carbonate of Soda, a pound,
Distilled Water, forty-eight fluid ounces,
Chloride of Sodium, four ounces,
Binoxide of Manganese, three ounces,
Sulphuric Acid, four ounces;

Dissolve the carbonate of soda in two pints of the water; then put the chloride of sodium and binoxide of manganese, rubbed to powder, into a retort, and add to them the sulphuric acid, previously mixed with three fluid ounces of water, and cooled. Heat, and transmit the chlorine first through five fluid ounces of water, and afterwards into the solution of carbonate of soda above directed.

NOTE.

SOLUTION OF CHLORINATED SODA. At first the colour of turmeric is changed to brown in this solution; afterwards it is destroyed. By the addition of dilute hydrochloric acid, carbonic acid and chlorine are evolved together: solution of sulphate of indigo is decoloured by the latter; lime is precipitated from lime-water by the former.

When this solution is properly prepared, no carbonic acid is expelled from the carbonate of soda; it has a yellow colour, a sharp saline and astringent taste, and a chlorine odour. By careful evaporation it yields crystals, which produce the original liquid when re-dissolved, and which consist of hydrate of chlorine in combination with carbonate of soda. When the solution is exposed to air, and allowed to evaporate spontaneously, it gives out chlorine, and yields crystals of carbonate of soda (FARADAY. *Quart. Journ.*, N. S., II., 84). It is sometimes called a *hypochlorite of soda*, but there is no evidence of the existence of hypochlorous acid in it. From its inventor, and the purposes to which it is usually applied, it has generally been termed *Labarracque's* disinfecting liquid.

The solution of chlorinated soda is used as an internal and external remedy. From ten drops to a drachm, or even more, acccording to the extent of its dilution, may be given for a dose (and repeated according to its effects) in from two to three ounces of plain or rose-water, sweetened with a small addition of syrup. In its general therapeutic powers, it resembles chlorine, but the presence of carbonate of soda of course modifies its effects. It is employed in typhus and typhoid fevers, in putrid sore throat, and in the malignant forms of other disorders, as an antiseptic; it is also considered astringent and tonic. Its beneficial effects are sometimes very marked, improving the secretions, lessening the fœtor of the breath and intestinal evacuations, promoting the quantity and correcting the quality of the urine, producing a moist skin, and alleviating the restless weariness, faintness, and prostration of strength. "In fever, I have seen dampness of the skin follow its use. Increased secretion of urine is a common effect of it. In fever, it improves the qualities of the evacuations. Under the continued employment of it, glandular enlargements and chronic mucous discharges have disappeared, from which circumstance chloride of soda has been denominated alterative and resolvent. All these effects depend, probably, on the alteration which the chloride gives rise to in the condition of the blood, and the change thereby produced in the action of the different organs. We must not overlook the important fact that the solution of chloride of soda used in medicine, contains bicarbonate (carbonate?) of soda, to which perhaps in many cases its beneficial effects are, in part at least, to be referred." (Pereira.)

Dr. A. T. Thomson states that he has administered chloride of soda, "largely diluted, in typhus and other low fevers, to counteract the sedative influence of the sulphuretted hydrogen which accumulates in the intestines in these fevers. I have found it, also, most valuable as an injection into the nostrils, for correcting the acrid offensive discharge which takes place from the nostrils in malignant scarlatina." (*Lond. Disp*).

Chloride of soda is also used in the form of gargle, to cleanse the mouth and fauces in ulcerated sore throat, and in mercurial ptyalism; and as a lotion to ill-conditioned ulcers, to check fetid discharges, arrest the progress of sloughing and gangrene, and promote the separation of the dead and living parts. There are some cutaneous disorders, also, in which chlorinated soda is used as a local remedy with marked success.

Chloride of lime (*see* Calx Chlorinata) may in many cases be used as a substitute for chloride of soda, especially as an external application; for internal use, chloride of soda is to be preferred.

The general therapeutic effects of *chlorine*, when given in solution, also correspond with those of chloride of soda, except such as depend upon the presence of the carbonated alkali. As a lotion, and in gargles, it is an effective antiseptic, and is sometimes used, when very largely diluted with water, as a common drink in fevers of a typhoid character or tendency.

As *disinfectants*, chlorine, and the chlorides of lime and soda, supersede all others. Gaseous chlorine may be diffused through infected atmospheres, as it is evolved from a heated mixture of chloride of sodium, binoxide of manganese, and sulphuric acid diluted with two parts of water; or it may be more simply obtained from a mixture of the binoxide of manganese and hydrochloric acid. In consequence, however, of its mischievous effects when respired, it requires to be resorted to with much caution in inhabited rooms, and especially in the chambers of the sick; hence, in such cases, the advantage of the chlorides of lime, and soda, which gradually, but yet effectively, evolve chlorine when merely exposed to the air, or when cloths dipped in their solutions are suspended in the infected apartments.

SODÆ SULPHAS.	SULPHATE OF SODA.
℞ Salis qui restat post destillationem Acidi Hydrochlorici, libras duas, Aquæ ferventis, octarios duos, Sodæ Carbonatis, quantum opus est;	Take of the salt which remains after the distillation of Hydrochloric Acid, two pounds, Boiling Water, two pints, Carbonate of Soda, as much as may be required;
Liqua salem in aquâ; tum adjice paulatim sodæ carbonatis quod satis sit ad acidum saturandum. Decoque, donec pellicula appareat, et, liquore colato, sepone, ut fiant crystalli. Has, effuso liquore, exsicca.	Dissolve the salt in the water; then gradually add as much carbonate of soda as may be required to saturate the acid. Boil down till a pellicle appears, and, having strained the solution, set aside that crystals may form. Having poured off the liquor, dry them.
NOTA.	NOTE.
SODÆ SULPHAS (*crystalli*). Aëri exposita in pulverem fatiscit, In aquâ totâ, in alcohole minimè liquatur. Lacmi et curcumæ colorem non mutat. Argenti nitras vix quicquam ex liquore diluto demittit: plurimùm autem barytæ nitras; idque acido nitrico non dissolvitur. Hujus salis crystalli ex 100 partibus 55 aquæ partes, in igne acri, exhalant.	SULPHATE OF SODA (*crystals*). Exposed to the air it crumbles into powder. Totally dissolved in water, very slightly by alcohol. It does not change the colour of litmus and turmeric. Nitrate of silver throws down scarcely anything from a dilute solution, but nitrate of baryta much more, and the latter (precipitate) is not dissolved by nitric acid. 100 parts of the crystals of this salt lose 55 parts of water when strongly heated.

This salt is so abundantly furnished by the wholesale manufacturer, and is found so pure and perfect in the market, that the above formula, and its appendages, are superfluous. It should have been placed, as formerly, in the list of the *Materia Medica*. (*See*, in reference to its production, the diagram, page 301).

Sulphate of soda, or *Glauber's Salt*, forms large transparent prismatic crystals, generally striated upon the surface, and resulting from a primary oblique rhomboid prism: they are efflorescent, and lose, by exposure to a dry and warm atmosphere, between fifty and sixty per cent. of water of crystallisation; they have a nauseously saline taste, and are soluble in rather less than three parts of water at 60°; the solubility then increases to the temperature of 92°, when it is at its maximum; and diminishes to 215°, at which point the salt is nearly of the same solubility as at 87°. When heated, the crystals of sulphate of soda undergo watery fusion, and when the whole of the water has been driven off at a red heat, the residuary anhydrous salt has an acrid, hot taste, and reabsorbs water with great avidity.

The ordinary crystals consist of—

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	19·75
Sulphuric Acid	1	40	24·69
Water	10	90	55·56
Crystallised Sulphate of Soda	1	162	100·00

Sulphate of soda is a mild purgative in the dose of six or eight drachms, dissolved in four or six ounces of water; it is often conjoined with manna and with senna, but of late years it has been little used, and is almost entirely superseded by sulphate of magnesia, which is, upon the whole, less unpleasant to the palate, and produces less thirst. The dried salt is of course effective in less than half the dose of the crystallised. Sulphate of soda is contained in many mineral waters.

SODÆ PHOSPHAS. *Phosphate of Soda.*

NOTA.	NOTE.
SODÆ PHOSPHAS (*crystalli*). Aëri exposita paululùm fatiscit. In aquâ tota, non in alcohole dissolvitur. Ex hoc liquore, quod a barii chlorido demittitur, albet, quodque ab argenti nitrate, nisi sodæ phosphas priùs usta fuerit, flavet. Utrumque in acido nitrico liquatur.	PHOSPHATE OF SODA (*crystals*). Exposed to the air it slightly effloresces. It is entirely dissolved by water, not by alcohol. The precipitate which is thrown down from this solution by chloride of barium is white, and that by nitrate of silver yellow, unless the phosphate of soda has been previously heated to redness. Both are soluble in nitric acid.

Remarks (by MR. PHILLIPS). "If the precipitate obtained by chloride of barium is not totally soluble in nitric acid, the phosphate of barytes is mixed with sulphate. When the phosphate of soda has been heated, it becomes *pyrophosphate*, and then gives a *white* pyrophosphate of silver when added to the nitrate."

This salt, for which no formula is given in the Pharmacopœia, is usually prepared by saturating the impure phosphoric acid obtained by the action of dilute sulphuric acid upon bone-earth, (*see* PHOSPHORUS, p. 405,) with soda, filtering and evaporating to crystallisation; it forms oblique rhombic prisms, soluble in about four parts of cold, and two of hot water, efflorescent and having an alkaline reaction on test paper. It consists of,

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	18·2
Phosphoric Acid	1	36	20·5
Water	12	108	61·3
Crystallised Phosphate of Soda	1	176	100·0

In the dose of four to eight or ten drachms, this salt is sometimes used as a saline aperient; it is not quite so disagreeable as sulphate of magnesia or sulphate of soda, but it by no means deserves the name which some have conferred upon it, of *tasteless purging salt:* it is usually given in broth or gruel, but is not very certain in its operation. It has been used as an alterative, that is, in small doses frequently repeated and long persevered in, in certain diseases supposed to be connected with a deficiency of phosphoric acid in the system. It has also been used, but without apparent success, in the treatment of diabetes.

SODÆ POTASSIO-TARTRAS.

℞ Potassæ Bitartratis contritæ, uncias sedecim,
Sodæ Carbonatis, uncias duodecim,
Aquæ ferventis, octarios quatuor;

Sodæ carbonatem in aquâ fervente liqua, et adjice paulatim potassæ bitartratem. Liquorem cola; tum lenem calorem adhibe, donec pellicula supernatet, et sepone, ut fiant crystalli. Has, effuso liquore, exsicca. Liquorem iterùm consume ut in crystallos abeat.

NOTA.

SODÆ POTASSIO-TARTRAS (*crystalli*). In aquâ tota liquatur. Argenti nitras, itèm barii chloridum nihil demittit. Curcumæ aut lacmi colorem non mutat. Acidum sulphuricum adjectum in potassæ bitartratem pars convertitur.

POTASSIO-TARTRATE OF SODA.

Take of Bitartrate of Potassa, powdered, sixteen ounces,
Carbonate of Soda, twelve ounces,
Boiling Water, four pints;

Dissolve the carbonate of soda in the boiling water, and gradually add the bitartrate of potassa. Filter the solution; then apply a gentle heat till a pellicle floats upon the surface, and set aside that crystals may form. Having poured off the solution, dry these. Again evaporate the liquor that it may deposit crystals.

NOTE.

POTASSIO-TARTRATE OF SODA (*crystals*). It is entirely soluble in water, and nothing is thrown down either by nitrate of silver or by chloride of barium. It neither changes the colour of turmeric nor litmus. By the addition of sulphuric acid it is in part converted into bitartrate of potassa.

In the above process, one of the two atoms of tartaric acid in the bitartrate of potassa, is saturated by the soda of the carbonate, and the carbonic acid is evolved, so that a neutral double salt results. It forms large and beautiful crystals, derived from a primary right rhombic prism, variously and often singularly modified, and generally produced as it were in halves, as if formed on planes passing through the centre of the entire crystals. It is soluble in about five parts of water at 60°, and in about two parts at 212°. It has a bitterish and saline flavour, and is slightly efflorescent in a dry atmosphere. When heated, it undergoes watery fusion, and the acid is first modified into a pyro-acid, and then decomposed. It consists of,

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	10·6
Potassa	1	48	15·9
Tartaric Acid	2	132	43·7
Water	10	90	29·8
Crystallised Potassio-Tartrate of Soda	1	302	100·0

This salt, called also *Rochelle* and *Seignette's salt*, from having been first introduced by M. de Seignette, a surgeon at Rochelle, is given in the dose of four to eight or ten drachms; what has been said elsewhere of the use of saline purgatives, applies to this; it is less disagreeable, but also less effective than sulphate of magnesia, and may be administered in any of the usual vehicles; not, however, without a partial decomposition in those containing the free mineral acids, as infusion of roses, &c. It may be prescribed, not inelegantly, in almond emulsion.

℞ Sodæ Potassio-Tartratis, ʒvj.
Misturæ Amygdalæ, f℥vss.
Spiritûs Myristicæ, f℥ss.
M. sumat tertiam partem secundâ quâque horâ.

It enters into the composition of the effervescent aperient commonly sold under the name of *Seidlitz powders.* They consist of two different powders; the one, (in white paper) consists of ʒij. of *potassio-tartrate of soda* and ℈ij. of *carbonate of soda;* the other, (in blue paper) of xxxv. grains of *tartaric acid.* The contents of the white paper are to be dissolved in half a pint of spring water, to which those of the blue paper are to be added: the draught is to be taken in a state of effervescence. The acid being in excess, renders it more grateful, and no less efficacious as a purgative. It should be recollected that, like the other neutral saline compounds of the vegetable acids, it is apt to exert an alkaline reaction on the urine.

SODÆ ACETAS. *Acetate of Soda.*

NOTA.	NOTE.
SODÆ ACETAS (*crystalli*). Aquâ tota, alcohole non omnino liquatur. Lacmi et curcumæ colorem non mutat. Non a barii chlorido, neque ab argenti nitrate dejicitur. Igne acri, in sodæ carbonatem transmutatur. Acidum sulphuricum adjectum odores aceticos elicit. Ex hoc vel ex alio quovis sodæ sale in aquâ soluto nihil demittitur per platini chloridum.	ACETATE OF SODA (*crystals*). Totally soluble in water, but not in alcohol. It does not change the colour of litmus or of turmeric. It is neither precipitated by chloride of barium nor nitrate of silver. In a strong fire it is converted into carbonate of soda. The addition of sulphuric acid evolves acetic odours. Nothing is thrown down by chloride of platinum, from this or any other salt of soda, when dissolved in water.

Mr. Phillips adds the following explanatory remarks to this *Note.* "The non-action of litmus, turmeric, chloride of barium, and nitrate of silver, shows that it is free from excess of acid or alkali; and that it contains neither a sulphate nor a chloride. In a strong heat, the hydrogen of the acetic acid is expelled, and portions of its carbon and oxygen form carbonic acid, which combines with the soda to form the carbonate. Sulphuric acid decomposes this salt, expelling the acetic acid, and forming sulphate of soda with the alkali. If it contain any salt of potash, it will be detected by the precipitate which it yields with chloride of platina."

Acetate of soda is prepared, as a source of acetic acid, by the manufacturers of pyroligneous acid, (*see* ACETIC ACID). It forms crystals derived from an oblique rhombic prism, soluble in about three parts of water at 60°, of a pungent and slightly bitter, but not disagreeable flavour, and composed of—

	Atoms.	Equivalents.	Per Cent.
Soda	1	32	23·3
Acetic Acid	1	51	37·3
Water	6	54	39·4
Crystallised Acetate of Soda	1	137	100·0

Acetate of soda is mildly aperient, diuretic, and diaphoretic, and may be administered in the same cases as acetate of potassa; but it requires to be given in at least twice the quantity.

SPIGELIA. *Radix.* Carolina pink, or worm grass. The Root of *Spigelia Marilandica. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Gentianaceæ.

This is a perennial plant which flowers in July and August, and is a native of the warmer parts of North America; the root is fibrous, and grows in a horizontal direction; the stalk is simple, erect, smooth, and about a foot high; the leaves are ovate, sessile, entire, deep-green, and in pairs; the flowers are large and funnel-shaped, and terminate the stem in a spike; the calyx is divided into five long segments; the corolla is monopetalous, long, and tubular, swelling towards the middle, bright-red, and dividing at the mouth into five pointed segments, yellow on the inside; the filaments are about the length of the tube, and crowned with pointed anthers; the germen is above the insertion of the corolla, small, ovate, and supports a roundish style, longer than the corolla, jointed near its base, and bearded towards the extremity; the stigma is obtuse; the capsule is two-celled, and contains many small angular seeds.

In doses of from twenty to sixty grains, the powder of the root of this plant has been administered as an anthelmintic; it operates briskly upon the bowels, and any active purge will occasionally expel lumbrici and ascarides; but it also appears to be possessed of narcotic powers, occasionally producing vertigo, dilated pupil, and convulsions. It is most active when fresh, and becomes uncertain and sometimes inefficacious when dried. It has a bitter taste, and is sometimes used in the form of a vinous tincture.

SPIRITUS RECTIFICATUS. *Hujus pondus specificum est* ·838.
SPIRITUS TENUIOR. *Hujus pondus specificum est* ·920.

Rectified Spirit, of the specific gravity of ·838. *Weaker* or *Proof Spirit*, of the specific gravity of ·920.

These are mixtures of alcohol and water, the rectified spirit contains about 18 per cent. (by weight), and the weaker spirit, or proof spirit, about 53 per cent. of water; so that the weight of absolute alcohol (of the specific gravity of ·796 at 60°), amounts to 82 per cent. in the former, and to 47 per cent. in the latter. (*See* ALCOHOL.)

SPIRITUS VINI GALLICI. The Spirit of French-wine. Brandy. (Germ. *Brantwein.*)

Brandy is a dilute alcohol: the average specimens contain about 54 per cent. of rectified spirit. The article sold under the name of brandy is of various quality and composition: the greater part of it is largely adulterated with corn spirit, colouring matter, and other things, to give it flavour. When pure and genuine it has a very pale brownish yellow tint, an agreeable, vinous, and somewhat aromatic odour and flavour, derived from a volatile oil, and differing a little according to the nature of the wine from which it has been obtained. When very old in the cask its colour gradually becomes deeper, and depth of tint, therefore, was a criterion of the age of the spirit, by which its quality was supposed to be improved, as well as its strength: it was this that induced the manufacturers of the trash commonly sold under the name of brandy to give it a dark-brown colour by the addition of burned sugar, a capital colouring matter for tinting wines and spirits, and in great request since *brown sherry* has come into fashion.

The article honestly vended under the name of *British Brandy* is not a disagreeable spirit, but, as far as I have seen, very unlike brandy in flavour; the imitation might certainly be much improved, but I am told that it suits the palates of those for whom it is principally intended better than the closer imitations.

The uses and abuses of brandy are mentioned under the Article ALCOHOL.

STALAGMITES, *see* CAMBOGIA.

STANNUM. Tin. (Germ. *Zinn.*)

NOTA.	NOTE.
STANNUM. Cum acido hydrochlorico coctum ferè totum liquatur. Liquor coloris expers est, sed auri chlorido adjecto, purpurescit. Quod a potassâ dejicitur albet, et eâdem suprà modum additâ, iterùm dissolvitur. Hujus pondus specificum est 7·29.	TIN. Boiled with hydrochloric acid, it is almost entirely dissolved. The solution is free from colour, but becomes purple by the addition of chloride of gold. What is precipitated by potassa is white, and when added in excess it is redissolved. The specific gravity of tin is 7·29.

Tin filings, and powdered tin, have been used as anthelmintics, but no metallic filings can be taken with impunity, and at present neither tin, nor any preparation of it are used by the prudent practitioner, so that it might have been properly omitted in the list of Materia Medica.

STAPHISAGRIA (*σταφις αγρια*, *wild vine*, from the resemblance of its leaves to those of the vine). *Semina.* Stavesacre. The seeds of *Delphinium Staphisagria*. *Cl.* 13. *Ord.* 3. Polyandria Triginia. *Nat. Ord.* Ranunculaceæ. (Delphinium, from *δελφινος*, *a dolphin*, the flower of the larkspur being supposed to look like a dolphin's head.)

This plant is a native of waste places in the South of Europe, and the Levant: it has an erect, simple, smooth, downy stem, of a purple tint, and from twelve to twenty inches high; the leaves are palmated, and divide into five or seven lobes, which are ovate, downy, veined, and pale-green; the leaf-stalks are strong and downy, arising alternately from the stem, and gradually shortening towards the top of the plant: the flowers are large, blue, and stand upon long footstalks, terminating the stalk in open spikes; there is no calyx; the corolla consists of five oval petals, of which the uppermost extends backwards, so as to form a hollow spur; the nectary is commonly divided into four leaves, which are smaller than those of the corolla; the two superior are narrow, small, erect, and at the base drawn out into spurs like that of the petal, in which they are enclosed; the other two are roundish; the filaments are about twenty, short, tapering, and crowned with large yellow anthers; the germens are three, tapering, downy, and supplied with short, filiform styles, terminated by simple stigmata; the three capsules are straight, oblong, tapering, and contain many rough, brown, angular seeds.

Stavesacre seeds are cathartic and emetic. Their use is confined to external application, especially mixed with hair-powder, for the destruction of lice; they might, therefore, be omitted in our present Materia Medica. They contain a salifiable base, called *delphinia*, which may be procured by boiling magnesia in the decoction of the seed, filtering, and treating the residue upon the filter with alcohol; upon evaporating the latter, delphinia remains in the form of very minute crystals, emimently poisonous.

According to Brandes, the seeds contain—

Fixed oil	19·10
Waxy matter	1·40
Delphinia	8·10
Gum	3·15
Starch	2·40
Albumen	3·70
Phytocolla	30·67
Sulphate of lime, potassa, and magnesia	2·15
Phosphate of lime and magnesia	3·62
Woody fibre	17·20
Water and loss	8·51
	100·

STARCH, *see* AMYLUM.

STRAMONII FOLIA ET SEMINA. (From *stramen*, straw; so called from its fibrous roots). Thorn-apple. The leaves and seeds of *Datura Stramonium*. *Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

This plant, said to be a native of America, is common over the whole of Europe, and found upon road-sides and rubbish heaps; it has a round branching stem, about two feet high, spreading and leafy: the leaves are large, and spring from the forks of the stem on long round petioles; they are irregularly ovate-triangular, sinuated, and unequal at the base; the flowers are large, axillary, solitary, on short peduncles; the calyx is about two inches in length, tubular, pentangular, and five-toothed; the corolla longer, white, funnel-shaped, and plaited; the filaments adhere to the tube, and support oblong, flat anthers; the style is filiform, and terminated with a club-shaped stigma; the fruit is a large, fleshy, ovate, four-cornered capsule, beset with spines, and containing many compressed seeds.

The herb has been analysed by Promnitz, and the seed by Brandes. The fresh herb contains

Extractive (with Daturia)	0·60
Gummy extractive	0·58
Resin	0·12
Green fecula	0·64
Albumen	0·15
Phosphoric acid and vegetable salts	0·23
Fibre	5·15
Water and loss	92·53
	100·

The seeds contain

Malate of daturia	1·80
Fixed oil	16·05
Wax	1·40
Resin	9·90
Red extractive	0·60
Gummy extractive	6·00
Bassorin and gum	11·30
Phytocolla	4·55
Albumen and gluten	7·40
Acetate and malate of potassa and salts of lime	0·60
Lignin	23·35
Water and loss	17·05
	100·

The whole herb is stimulating and narcotic, but less certain in its action as a sedative than several other articles of the Materia Medica, which are therefore substituted for it. It contains a salifiable base, discovered by Brandes, to which its active powers are referrible, which has been called *daturia*. Smoked, in the manner of tobacco, the dried plant is said to be highly effectual in the relief of spasmodic asthma; but the praises originally bestowed upon its virtues have not been sanctioned by experience.

Dr. Bree asserts that its indiscriminate use in this way has occasioned dangerous or hurtful effects in frequent instances. In some cases of aged or apoplectic subjects, death has been the consequence. No considerate physician, he observes, can countenance the latitude of its application, or advise its use without well knowing the nature of the case of asthma on which he is consulted.

According to Dr. Marcet, the extract of the seeds is more active than that prepared from the whole plant; but in other respects the virtues of the two are analogous: he recommends it in cases of chronic disease attended with acute pain, in doses of from one eighth of a grain to one grain: it appears to have been eminently successful in sciatica.

The *extract of the seed* is the only officinal preparation, but a tincture has also been recommended, and it is probable that daturia, when more accurately examined, may prove a valuable therapeutic agent.

EXTRACTUM STRAMONII.	EXTRACT OF STRAMONIUM.
℞ Stramonii Seminum, uncias quindecim,	Take of Stramonium Seed, fifteen ounces,
Aquæ destillatæ ferventis, congium;	Boiling distilled Water, a gallon;
Macera per horas quatuor, in vase leviter clauso propè ignem: dein semina exime, et contunde in mortario lapideo: contusa liquori redde. Tum decoque ad octarios quatuor, et liquorem adhuc calentem cola. Denique ad idoneam crassitudinem consume.	Macerate for four hours in a lightly-covered vessel; then take out the seeds and bruise them in a stone mortar; return them, when bruised, into the liquor. Then boil down to four pints, and strain the liquor whilst hot. Lastly, evaporate to a proper consistency.

Cases of accidental poisoning by stramonium occasionally occur: the leading symptoms which it produces are stupor, dilated pupil, and delirium, and occasionally spasms and palsy. Several instances are quoted by Dr. Christison, and among them the following: "In an instance communicated to me by my colleague, Dr. Traill, where eighteen or twenty grains of extract of stramonium were taken by mistake for extract of sarsaparilla, the symptoms were dryness of the throat immediately afterwards, then giddiness, dilated pupils, flushed face, glancing of the eyes, and incoherence, so that he seemed to his friends to be intoxicated; and subsequently there was incessant incoherent talking like that of demency. Emetics were given without effect, and there was little amendment obtained from blood-letting, leeches to the temples, cold to the head, or purgatives. But after a glass of strong lemonade, vomiting took place, the symptoms began to recede, in ten hours he recognised those around him, and next day he was pretty well."

In a case related in *Rust's Magazine*, caused by a decoction of the fruit, which was mistaken for thistle heads, the leading symptoms were spasmodic closing of the eyelids and jaws, spasms also of the back, complete coma, and excessive dilatation and insensibility of the pupil. "This case, which seems to have been a very dangerous one, was rapidly cured by free blood-letting. Blood-letting, indeed, seems peculiarly called for in poisoning with the thorn-apple, on account of the strong signs of determination of blood to the head."

The following fatal case is given by Mr. Duffin (*Med. Gaz.* xv. 320). A child of his own, two years old, swallowed about a hundred seeds without chewing them: soon after she become fretful and like a person intoxicated; in the course of an hour efforts to vomit ensued, together with flushed face, dilated pupils, incoherent talking, and afterwards wild spectral illusions and furious delirium. In two hours and a half she lost her voice and the power of swallowing, evidently owing to spasms of the throat. Then croupy breathing and complete coma set in, with violent spasmodic agitation of the limbs, occasional tetanic convulsions, warm perspiration, and yet an imperceptible pulse. Subsequently the pulse became rapid, the abdomen tympanitic, and the bladder paralysed, but with frequent involuntary stools, probably owing to the administration of cathartics, and death took place in twenty-four hours. At an early period, twenty seeds were discharged by an emetic, the stools contained eighty, and none were found in the alimentary canal after death. There was never any marked sign of congestion of blood in the head, except flushed face at the beginning. On examination after death the brain was healthy, no morbid appearance was presented by the stomach and intestines, and the only unusual appearances were a slight blush over the pharynx, larynx, and upper part of the gullet, thickening and swelling of the rima glottidis, and a semi-coagulated state of the blood.

Dr. Christison observes that dangerous effects may result from the application of thorn-apple to the skin when deprived of the cuticle: he cites from the *Journ. de Chim. et Méd.* (vi. 722.) an instance of alarming narcotism from the application of the leaves to an extensive burn.

STYRAX (from *στυραξ, a reed*, in which it was collected and preserved). *Balsamum.* The balsam of *Styrax officinale.* *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Styraceæ.

This tree is a native of the south of Europe and the Levant, and is common over Greece and the Peloponnesus; it rises to the height of fifteen or twenty feet, and has a rough, gray bark; the leaves are about two inches long, and an inch and a half broad, bright-green on the upper surface, hoary beneath, petiolate, alternate, elliptical, pointed, and entire: the flowers are in terminal clusters; the corolla is monopetalous, funnel-shaped, large, and white; the filaments are placed in a circle, and support erect, oblong anthers; the germen is oval, with a slender style, and simple stigma; the fruit is an ovate, globular drupe, containing one or two angular nuts.

Styrax is among the stimulating expectorants of the older writers. When pure it is in drops, of a pale and dark-brown colour, or in mottled masses composed of their mixture, extremely fragrant, and consisting of resin, volatile oil, and benzoic acid.

The substance known under the name of *Styrax calamita* (reed storax) originally consisted of beech saw-dust, mixed with a strong spirituous solution of genuine storax, and pressed into cakes; but what is now usually sold is dirty saw-dust, mixed with balsam of Peru, and sometimes smelling of naphthalin, or other products of coal-tar. It is useless, and should not be retained.

Pilulæ Styracis Compositæ.	Compound Pills of Styrax.
℞ Styracis colati, drachmas tres,	Take of Styrax, strained, three drachms,
Opii duri, contriti,	Hard Opium, powdered,
Croci, singulorum drachmam;	Saffron, of each a drachm;
Simul contunde, donec corpus unum sit.	Pound them together till incorporated.

These pills afford a convenient form of opium; but the trash which goes under the name of *styrax* is a bad vehicle for it, and saffron is a useless addition. Five grains contain one grain of opium. Like the *Pilulæ Saponis Compositæ*, they furnish a means of prescribing *opium* without the appearance of that word in the prescription.

STRYCHNIA (from *στρωννυμι, I overthrow?*) *see* Nux Vomica.

SUCCINUM. (*Succus*, juice, because supposed to exude from a tree.

Amber is probably a resin of antediluvian origin. It occurs associated with coal and bituminous wood, and also in a conglomerate upon the sea shore, from which it is washed out by the waves. It has been obtained most abundantly in Prussia, and upon the shores of the Baltic. In Poland it has been met with in an inland sandy soil, mixed with pine cones. It has also occurred embedded in limestone and gypsum.

Amber is not used in medicine; but when subjected to destructive distillation, it affords an acid and oil, both of which have a place in some Pharmacopœiæ, though the latter is now only retained by the London College.

Amber is sometimes mixed with various resins, and especially with fragments of copal, which are detected by their difference of fracture and colour, and by not exhaling the peculiar odour which amber does when put upon a hot iron.

Oleum Succini.	Oil of Amber.
In alembicum immitte succinum, ut destillent balneo arenæ, calore paulatim aucto, liquor acidus, oleum, et sal oleo inquinatus. Dein. iterùm et tertiò oleum destillet.	Put amber into an alembic, so that an acid liquor, an oil, and a salt contaminated with the oil may distil in a sand-bath, with a heat gradually increased. Afterwards let the oil distil again and a third time.

The ultimate components of amber are carbon, hydrogen, and oxygen; its proximate elements are volatile oil, two resins, succinic acid, and bitumen. The oil procured by the above process, is perhaps partly an educt, but principally a product of the action of heat: what first passes over is brown and thick, but becomes thinner and paler by the second and third rectification. It has a peculiar bituminous odour, and a hot pungent flavour; it is insoluble in water, and only sparingly soluble in alcohol.

Oil of amber was once regarded as a powerful antispasmodic stimulant, and given in the dose of from five to fifteen drops in hysterical and convulsive affections, either triturated with sugar in the form of elæosaccharum, or diffused by mucilage or the yolk of egg through some aromatic water. It is now scarcely ever prescribed except as a liniment, in cases of whooping cough, when one of the following may be employed, rubbed upon the spine and the pit of the stomach; the liniment with oil of cloves is said to be similar to *Roche's Embrocation.*

℞ Spirit. Camphor,
Tinct. Opii,
Olei Succini, āā f℥ss.
Fiat linimentum.

℞ Olei Succini,
Olei Caryophillor, āā f℥ss.
Olei Olivæ, f℥j.
M. fiat embrocatio.

Neither of these applications must be employed except with great caution in the cases of young children, and they are inadmissible for infants.

SULPHUR. *Sulphur sublimatum.* Sublimed sulphur.

Sulphur occurs *native*, associated with gypsum, limestone, and sulphate of strontia. It is also abundant among volcanic products, and in union with various metals forms some of the most abundant and important metallic ores; such are the sulphurets of copper, of lead, of mercury, &c.

Native sulphur is imported into England from Sicily and Naples, and largely consumed by the manufacturers of sulphuric acid and of gunpowder, and by the bleachers of cotton goods.

Roll sulphur is chiefly obtained by roasting sulphuret of copper: it is collected in a chamber of brick-work, through which the fumes of the heated ore are made to pass, and afterwards purified by fusion and cast into sticks.

Sublimed sulphur or *flowers of sulphur*, is obtained by heating sulphur up to 500° or 600°, when it rapidly rises in vapour, and is condensed in sufficiently capacious receptacles, in the form of a fine powder; the residue is called *sulphur vivum* in old Pharmacopœiæ.

Sulphur is subject to various contaminations; roll sulphur especially is said frequently to afford traces of sulphuret of arsenic. Its purity may be determined by boiling 100 grains in four ounces of oil of turpentine: the solution is poured off while hot, and it deposits the sulphur it had dissolved, as it cools: the cold oil may then again be boiled on the residue, and again cooled, and this operation repeated as long as it dissolves anything: the weight of the insoluble residue indicates the amount of impurity.

Sublimed sulphur, or finely-powdered native sulphur, is most commonly used as a gentle laxative and diaphoretic. It is best administered in the form of electuary, and may be taken in the dose of a drachm or two twice or thrice a day, so as gently to act upon the bowels. In this way it relieves hæmorrhoidal affections of the rectum. When its use is continued for some time its odour is often very manifest upon the skin, especially when aided in that direction by other diaphoretics, or when administered in warm weather.

Sulphur has also proved useful in various rheumatic affections. The celebrated remedy for chronic rheumatism called the *Chelsea Pensioner*, is an electuary composed of a drachm of guaiacum, two drachms of powdered rhubarb, an ounce of cream of tartar, two ounces of flowers of sulphur, one nutmeg in powder, and a sufficient proportion of clarified honey: two large tea-spoonsful to be taken night and morning.

Sulphur is also given as an alterative, in chronic cutaneous diseases, and it has proved useful as a vermifuge.

It is a valuable external application in many cutaneous affections, and more especially in *scabies*, for which purpose the simple ointment is to be preferred; it should be applied night and morning. The compound ointment is sometimes used, but it is apt to irritate, it is, however, a good pomatum for the destruction of lice.

UNGUENTUM SULPHURIS.	OINTMENT OF SULPHUR.
℞ Sulphuris, uncias tres,	Take of Sulphur, three ounces,
Adipis, libram dimidiam,	Lard, half a pound,
Bergamii Olei, minima viginti;	Oil of Bergamot, twenty minims;
Misce.	Mix.

UNGUENTUM SULPHURIS COMPOSITUM.	COMPOUND SULPHUR OINTMENT.
℞ Sulphuris, libram dimidiam,	Take of Sulphur, half a pound,
Veratri contriti, uncias duas,	White Hellebore, powdered, two ounces,
Potassæ Nitratis, drachmam,	Nitrate of potassa, a drachm,
Saponis mollis, libram dimidiam,	Soft soap, half a pound,
Adipis, libram cum semisse,	Lard, a pound and a half,
Bergamii Olei, minima triginta;	Oil of Bergamot, thirty minims;
Misce.	Mix.

SULPHURIC ACID. *Acidum Sulphuricum.*

NOTA.	NOTE.
ACIDUM SULPHURICUM. Coloris expers est. Pondus specificum est 1·845. Quod restat, ubi acidum usque ad siccitatem destillatum sit, partem quadringentesimam sui ponderis non excedit. Acidum sulphuricum dilutum vix ab acido hydrosulphurico coloratur.	SULPHURIC ACID. It is free from colour. Its specific gravity is 1·845. What remains after the acid has been distilled to dryness does not exceed the four-hundredth part of its weight. Diluted sulphuric acid is scarcely coloured by hydrosulphuric acid.

Sulphuric acid was formerly called *oil of vitriol*, and prepared by the distillation of *green vitriol*, or sulphate of iron, at a very high temperature. It is now obtained by burning a mixture of sulphur and nitre in a furnace so constructed that the resulting fumes may pass into a capacious leaden chamber, the floor of which is covered with water, or into which steam is admitted. The water gradually acquires an intense acidity, and when it has become sufficiently sour, or of an adequate density, it is let off into shallow leaden boilers, where it is evaporated till it acquires a specific gravity of about 1·70; it is then transferred into platinum stills, in which it is further boiled down till it acquires the specific gravity of 1·84 at 60°: it then is drawn by a siphon out of the still into a cistern lined with platinum, where it is suffered to cool, and ultimately ladled out into *carboys*, or large globular bottles of green glass protected by wicker-work, in which it is supplied to the public.

The fumes which are produced by the combustion of the mixture of sulphur and nitre, consist of sulphurous and nitrous acid; when condensed in the water of the chamber, the nitrous acid imparts oxygen to sulphurous acid, and converts it into sulphuric acid; the nitrous acid, by this loss of oxygen, reverts to the state of nitric oxide gas, which, mixing with the air of the chamber, resumes oxygen, and again becomes nitrous (or hyponitrous) acid, and this is again ready to convert another portion of sulphurous into sulphuric acid. The minute details of this manufacture would be misplaced here, but they will be found in chemical works, and are extremely curious and interesting.

Sulphuric acid, as it usually occurs, is a transparent, colourless and inodorous liquid, of the specific gravity of 1·84. It is extremely fixed, and requires a temperature approaching a red heat (about 620°) for its vaporisation. It congeals at — 15°. It is extremely caustic and corrosive, and feels soapy in consequence of its chemical action upon the cuticle; it is intensely sour when largely diluted with water: it is especially characterised by its strong affinity for water, so that when exposed to the asmosphere it dilutes itself by absorbing aërial vapour, and when mixed with water, great heat is evolved, four parts of acid and one of water producing a temperature of 300°: it is a very powerful chemical agent, and displaces the greater number of other acids from their combinations; it is also very energetic in its action upon most organic bodies, especially when aided by heat; it chars them, abstracts water, and is itself often decomposed. When heated with charcoal, many of the metals, and other combustibles, it imparts a portion of its oxygen to them, and is converted into *sulphurous* acid.

Sulphuric acid of the above specific gravity is a compound of 1 atom of anhydrous acid and 1 atom of water; the anhydrous acid, as it probably exists in the dry *sulphates*, and as it is obtained by distilling certain sulphates at a high heat, is a white crystalline solid, composed of

	Atoms.	Equivalents.	Per Cent.
Sulphur	1	16	40
Oxygen	3	24	60
Anhydrous Sulphuric Acid	1	40	100

The hydrated, or common sulphuric acid is a sulphate of water, and consists of

	Atoms.	Equivalents.	Per Cent.
Anhydrous Acid	1	40	81·6
Water	1	9	18·4
Liquid Acid, or Oil of Vitriol	1	49	100·0

The strength or value of sulphuric acid may be ascertained by its saturating power (as in the operation of alkalimetry), or, if pure, by its density; and several valuable tables are given in chemical works, showing the density of the various mixtures of the pure acid and water, and the relative quantities of real or anhydrous acid which they contain.

Sulphuric acid is a most important chemical agent in the pharmaceutical laboratory: in its concentrated state it is sometimes used as a caustic, but the difficulty of confining the limits of its action renders it applicable in a few cases only. Like nitric acid, it would probably be effectual as an application to the bites of rabid animals. An ointment containing sulphuric acid has been prescribed as rubefacient in some cases of diseased joints, and in paralysis, and occasionally as a styptic; but it is an inconvenient application. It is made by carefully triturating a drachm of the acid with an ounce of lard.

ACIDUM SULPHURICUM DILUTUM.	DILUTED SULPHURIC ACID.
℞ Acidi Sulphurici, fluidunciam cum semisse,	Take of Sulphuric Acid, a fluid ounce and a half,
Aquæ destillatæ, fluiduncias quatuordecim cum semisse;	Distilled Water, fourteen fluid ounces and a half;
Acidum aquæ paulatim adjice et misce.	Add the Acid gradually to the water, and mix them.

When sulphuric acid is diluted with water, the mixture becomes slightly turbid, in consequence of the precipitation of a minute quantity of sulphate of lead contained in the concentrated acid of commerce; this should be allowed to subside, and the clear dilute acid may then be poured off for use. A fluidrachm of the dilute acid contains about ten grains of the strong acid, and will saturate twenty-eight grains of crystallised carbonate of soda.

The dose of the diluted sulphuric acid of the *London Pharmacopœia* is from five to thirty or forty minims, in an ounce and a half to two ounces of liquid, but the extent to which it may be given will much depend upon the quantity of the diluent or vehicle. It is a tonic, and to a certain extent astringent and refrigerant, and is therefore selected in all those cases where acids are indicated, and where it is desirable to avoid diarrhœa. It is an excellent remedy in all those diseases of debility attended by profuse perspiration, more especially in low and hectic fever, and as a tonic for convalescents. It is often prescribed in hæmorrhages, more especially in pulmonary hæmorrhage, and hæmatemesis. "In malignant erysipelas, with a tendency to hæmorrhage, it has been given to the amount of a fluid ounce in twenty-four hours; and we have administered it with evident advantage, to the same amount, in violent uterine hæmorrhage, and in obstinate scabies." (*Lond. Disp.*) When the urine has a tendency to phosphatic depositions, attended by loss of appetite, impaired digestion, listlessness, and a dirty tongue, this acid, in conjunction with small doses of saline aperients, is of great efficacy.

Dilute sulphuric acid may be administered in any of the simpler bitter infusions; the infusion of cascarilla, of calumba, and of cinchona, are among the preferable vehicles or adjuncts. Where it has a tendency to gripe or purge, it may be conjoined with aromatics, or with small doses of tincture of opium. It is frequently employed in gargles, and is especially useful in cases of relaxed uvula. The following are a few of the innumerable formulæ for its administration:—

℞ Infusi Rosæ comp.
Infus. Gentianæ comp. āā f℥iijss.
Syrup. Aurant.
Tinct. Aurant. āā f℥ss.
Acid. Sulph. dilut. fʒiss.
Misce. Cochl iij. vel iv. bis die.

℞ Infus. Cascarillæ, f℥iss.
Magnesiæ Sulphatis, ʒj.
Acid Sulph. dil. ♏xv.
Misce. Bis vel ter die sumendus.

℞ Infusi Lupuli, fʒx.
Acid. Sulp. dil. ♏x.
Tinctur. Lupuli, fʒj.
Syrup. Zingiberis, fʒss.
Misce pro haustu, meridie et ante prandium sumendo.

℞ Syrupi Mori, f℥j.
Acid Sulp. dilut. fʒij.
Aquæ Rosæ, f℥vjss.
Spirit Myrist. f℥ss.
M. fiat gargarisma.

As an adjunct to the preparations of cinchona and quinia, sulphuric acid has already been noticed. Where it is frequently or continuously used, it should be swallowed quickly and the mouth washed with water afterwards, to prevent its deleterious action upon the teeth; the same precaution applies to all other acid remedies.

Cases of *poisoning by sulphuric acid* are not unfrequent; the principal symptoms which it occasions are intense pain of the throat and stomach, attended by tumefaction of the throat, and more or less disorganisation arising from the caustic action of the acid upon the parts over which it passes. There is also incessant vomiting, and large quantities of mucus often streaked with blood are thrown up. The pulse sinks, faintness and cold sweats follow, and the patient suffers under constitutional symptoms resembling those of a wound or rupture of the stomach. The mental faculties are generally unimpaired. The best antidote is chalk or whiting and water, which should be taken in sufficient quantity to neutralize the acid; soap and water may also be resorted to; as diluents, in such cases, milk, and the whites of eggs with water may be used. Instances have occurred in which the concentrated acid has remained for some time in the stomach, and has been ultimately entirely ejected by vomiting, the patient having recovered. In these cases a very copious glairy or mucous secretion seems to have defended the parts from the action of the acid.

SYRUPI. Syrups. (*Serab*, a potion. *Arab.*)

Syrups are, with few exceptions, unimportant preparations; they are objectionable, from their tendency to ferment and decompose, and should, as far as possible, be excluded from Pharmacopœiæ. The only general directions given respecting them, in the *London Pharmacopœia*, are the following:—

Conserventur Syrupi in loco, ubi calor gradum 55^{mum} nunquam excedat.	Let Syrups be kept in a place the temperature of which never exceeds 55°.

This is probably with a view to prevent their fermentation; but, with every precaution as to temperature, syrups which abound in vegetable mucilage become ropy and acescent, and others deposit crystals of sugar.

The following are the syrups ordered by the London college:—

Syrupus (simplex) .	. Syrup (simple) *see* SACCHARUM.
Syrupus Altheæ .	. Syrup of Marshmallow, *see* ALTHEA.
Syrupus Aurantii .	. Syrup of Orange Peel, *see* AURANTIUM.
Syrupus Croci .	. Syrup of Saffron, *see* CROCUS.
Syrupus Limonum .	. Syrup of Lemon, *see* LIMONES.
Syrupus Mori .	. Syrup of Mulberries, *see* MORUS.
Syrupus Papaveris .	. Syrup of Poppy, *see* PAPAVER.
Syrupus Rhamni .	. Syrup of Buckthorn, *see* RHAMNUS.
Syrupus Rhæados .	. Syrup of Red Poppy, *see* RHŒAS.
Syrupus Rosæ .	. Syrup of Roses, *see* ROSA.
Syrupus Sarzæ .	. Syrup of Sarsaparilla, *see* SARZA.
Syrupus Sennæ .	. Syrup of Senna, *see* SENNA.
Syrupus Tolutamus.	. Syrup of Tolu, *see* BALSAMUM.
Syrupus Zingiberis .	. Syrup of Ginger, *see* ZINGIBER.

TABACUM. *Folia Exsiccata.* Tobacco. The dried leaves of *Nicotiana Tabacum.* *Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

The generic name of this plant is from that of M. Nicot, an agent of Francis II., who sent the seed from Portugal to Catherine de Medecis.

It was called *tobacco* from having been brought from the island of Tobago; or, according to others, from Tobaco, a province of Mexico. It is a native of the hotter parts of America, but is cultivated in many parts of Europe. "It has a long and fibrous root. The stem is five or six feet high, erect, round, hairy, and viscid, branching at top; leaves sessile, very large, ovate or lanceolate, acuminate, viscid, pale green. Bracts linear, acute. Flowers panicled on the end of the stem and branches. Calyx swelling, hairy, glutinous, half as long as the corolla, ending in five acute segments; corolla funnel-shaped, swelling towards the top, the border dull red, expanding, with five acute lobes; filaments inclined to one side, with oblong anthers; ovary ovate, style long and slender, stigma cloven; capsule ovate, invested with the calyx, two-celled, two-valved, but opening crosswise at top, loculicidal. Seeds very numerous, small, somewhat uniform, attached to a fleshy receptacle. This species yields the Virginian, Havannah, and pigtail tobaccos of the shops, and, probably, the principal of that which comes from India, in the form of cheroots." (LINDLEY. *Flora Medica.*)

The fresh leaves are comparatively inodorous and insipid, but, when dried, they acquire a peculiar odour, and a bitter narcotic flavour, which is readily yielded to hot water. It has been repeatedly analysed; among others by Vauquelin (*Ann. de Chim.*, LXXI.), who found, in the expressed juice of the leaves, a considerable quantity of albumino-glutinous matter, together with a peculiar volatile principle, which he termed *nicotin*, a peculiar red extractive matter, a green fecula, acetic acid, supermalate of lime, chloride of potassium, hydrochlorate of ammonia, and nitrate of potassa. More recently Posselt and Reinmann have published an analysis of tobacco leaves (*Mag. Pharm.* XXIV. & XXV.), who found in them the following proximate principles:—

Nicotina	0·060
Nicotianin	0·010
Bitter extractive	2·870
Gum	1·740
Albumen	0·267
Gum resin	0·260
Gluten	1·048
Malic acid	0·510
Malate of ammonia	0·120
Sulphate of potassa	0·048
Chloride of potassium	0·063
Malate and nitrate of potassa	0·095
Phosphate of lime	0·166
Malate of lime	0·242
Silica	0·088
Lignin, and a trace of starch	4.969
Water	88·280
	100·836

The active principle of tobacco appears to be what is termed *nicotina;* it was obtained as follows:—Boil twelve pounds of dried tobacco leaves in water, acidulated with sulphuric acid. Evaporate the decoction carefully to dryness, and digest in alcohol of 0·848 sp. gr.; distil off the greater part of the alcohol, and mix the residue with hydrate of magnesia or of lime. Then distil again; the product of this distillation is water, holding nicotina and ammonia in solution. By agitating it with ether, a portion of the nicotina is dissolved by the ether. The aqueous portion separated from the ether is poured back upon the residual matter in the retort, and distilled again. The distilled liquid, agitated again with ether, gives out another portion of nicotina. The distillation and agitations with ether are to be continued till the residue has only a bitter taste, and has lost its acrimony. The ethereal solutions are then to be deprived of water by chloride of calcium, the liquid decanted off, and distilled by a gentle heat. The ether passes over, while the nicotina does not rise in vapour below 212°.

Nicotina has a syrupy consistence, brown colour, and acrid taste; it may be purified by distillation in an oil-bath at 284°. According to Henry and Boutron-Charlard, it is crystallisable (*Journ. de Pharm.*, XXII.) They obtained it by distilling sixteen ounces of tobacco with a solution of 6·4 ounces of caustic soda, in 332 cubic inches of water. The product of the distillation was received in a glass vessel, containing an ounce of sulphuric acid, diluted with rather more than three times its weight of water. The process was stopped when 150 cubic inches had passed over. The product, which must be kept slightly acid, is evaporated down to about 1500 grains; it is then cooled, filtered, and distilled in a small retort, with excess of caustic soda. A colourless volatile liquid is obtained, which is to be concentrated in vacuo to the consistence of syrup. It gradually deposits deliquescent crystals of nicotina.

Nicotina is inodorous when cold, but when heated, smells acrid and disagreeable, like tobacco. It has an alkaline reaction on reddened litmus and on turmeric. It is soluble in water and in ether. Its specific gravity is 1·048. It is a virulent poison; a single drop killed a large dog. The salts of nicotina are acrid, very soluble, and difficultly crystallisable. The average quantity of nicotina, yielded by 1000 parts of different kinds of tobacco, varied from 3·86 to 11·2. Virginia tobacco yielded one per cent.

The substance called by Posselt and Reinmann *nicotianin*, they obtained as follows:—Distil a mixture of six pounds of tobacco leaves and twelve pounds of water, till one-half of the liquid has passed over. Add to the liquor six pounds of water, and distil a second time. Repeat this a third time. On the surface of the liquid which has distilled over, about eleven grains of a fatty substance floats, which is nicotianin. It smells like tobacco smoke, and has an aromatic bitter taste; it is volatile, insoluble in water and in dilute acids, but soluble in alcohol and ether, and in caustic potash.

An abstract of what is known respecting the toxicological history of tobacco will be found in Dr. Christison's treatise. Sir Benjamin Brodie observed a considerable difference in the poisonous effects of the infusion of tobacco, and of the empyreumatic essential oil. Four ounces of the infusion, injected into the rectum of a dog, killed it in ten minutes, by paralysing the heart, for after death the blood in the aortal cavities was arterial. The oil, on the contrary, produces convulsions and coma, but does not affect the heart (*Phil. Trans.*, 1811). Orfila found that five drachms and a half of rappee, introduced into a dog's stomach, and retained by ligatures, produced nausea, giddiness, stupor, twitches in the muscles of the neck, and death in nine hours.

Dr. Christison observes "that the effects in man are allied to those produced in dogs by the infusion. In a slight degree, they are frequently witnessed in young men while making their first efforts to acquire the absurd practice of smoking. The first symptoms are acceleration and strengthening of the pulse, with very transient excitement, then sudden giddiness, fainting, and great sickness, accompanied with a weak, quivering pulse. These effects are for the most part transient and trifling, but not always. Some degree of somnolency is not uncommon. Dr. Marshall Hall has given an interesting account of a young man who smoked two pipes for his first debauch, and, in consequence, was seized with nausea, vomiting, and syncope, then stupor, stertorous breathing, general spasms, and insensible pupil. Next day the tendency to faint continued, and in the evening, the stupor, stertor, and spasms returned, but, from that time, he recovered steadily. Gmelin has quoted two cases of death from excessive smoking."

Death has also ensued from the incautious use of tobacco injections. In one case, related by Dr. Graef, of Hamburgh, an ounce was boiled for fifteen minutes in water; the individual was seized in two minutes with vomiting, convulsions, and stupor, and died in three quarters of an hour. In another case, two ounces of tobacco were inadvertently substituted for two drachms; the person became, as it were, intoxicated, and died almost immediately. Even two drachms, however, is not a safe dose. An anonymous writer in the *Medical and Surgical Journal* (IX., 150) says, a patient of his died in convulsions, an hour or two after receiving a clyster, composed of two drachms, infused in eight ounces. In the *Acta Helvetica* there is the case of a woman who expired a few hours after the use of an injection made with one drachm only.

Snuff, in its genuine form, is powdered tobacco, but a variety of additions are generally made, such as perfumes and volatile oils, carbonate of ammonia, salammoniac, and common salt, powdered glass, urine, rotten wood, and other things, which are kept secret; some kinds of snuff are moistened with sugar-cane juice or molasses and water, and acquire a peculiar flavour from fermentation, such as the *Macabau* of Martinique. To persons who are not habituated to it, snuff is sometimes productive of deleterious effects. Morgagni relates a case in which sneezing produced a fatal attack of apoplexy; and "Van Swiater has satisfactorily shown," says Dr. Paris, "that continued paroxysms of sneezing tend to load the vessels of the head with blood; for the violent contraction of the chest impedes for a time the passage of blood through the lungs, and therefore, obstructs the return of venous blood from the brain, the vessels of which are, in consequence, greatly distended; the face therefore reddens, and becomes turgid, the eyes are suffused with water, and appear full and distended. Its occasional dangerous violence is said to have given origin to the benediction so universally bestowed on those who sneeze." (*Pharmacologia.*)

Upon the unseemliness of snuff-taking, as relates to the dirty discharge from the nose, and the quantity which is spilt about the dress there can be but one opinion, but how far it may prove beneficial or injurious when the habit is fully established, admits of doubt. In these cases, its more violent effects as an errhine soon diminish, and, indeed, cease altogether, but it still operates as a local stimulant, and tends to keep up an unnatural excitement; it generally occasions a stuffiness, as it is called, in the nose, and, as is the case with dram-drinking and opium-eating, the quantity required to produce a given effect is always in an increasing ratio, so that some professed snuff-takers have the box constantly in hand, and are absolutely miserable without it. It is, however, difficult to get any direct evidence of its supposed pernicious effects. Dr. Cullen states, that "whenever the nasal discharge has been considerable, the laying aside the custom of taking snuff has been productive of evil;" yet I have known more than one instance where it has been indulged in for a long series of years, and abruptly discontinued, without any bad consequence. Nasal obstructions, morbid secretion of viscid mucus, irritation of the larynx and trachea, and dyspeptic symptoms, may sometimes be referred to it. Dr. Christison observes, that writers on the diseases of artisans have made many vague statements on the supposed baneful effects of the manufacture of snuff on the workmen, but very minute and accurate inquiry into the real state of the case, has not verified such opinions, it appearing that the workmen very easily become habituated to the atmosphere of the manufactory, that they are not particularly subject either to special diseases or to disease generally, and that they live on an average quite as long as other tradesmen. This statement is founded upon reports relative to the tobacco manufactories of France; but I am told that in England, and in London more especially, the result is less favourable, and that pulmonary complaints, including asthma, are often fatal to the workmen in snuff-mills; but such affections also prevail among drug-grinders in general, so that I do not think any special inference, bearing particularly on tobacco, can be drawn from the fact.

As a therapeutic agent, tobacco is a powerful and apparently direct sedative, when administered internally in the form of infusion or tincture; it is also diuretic; at present its use is almost limited to injection, as an enema, in cases of spasmodic constipation, of hernia, and of retention of urine: its good effects, however, are unfortunately almost always very problematical, and the fainting fits, and other effects above adverted to, which it occasionally induces, are of a dangerous and alarming nature. On the whole it is doubtful whether it should ever be prescribed, excepting in very urgent cases, and then with the utmost caution. Even the external use of tobacco washes, which are sometimes employed to cure the itch, is dangerous, and should be prohibited. The *Infusum Tabaci* of the Pharmacopœia is the usual form for clysters, but the preceding statements show that, although it is a weak infusion, it cannot be prescribed with impunity. Sometimes an injection of the smoke of tobacco is used as a substitute for the infusion; it is said to be a more penetrating and equally powerful and dangerous sedative.

Enema Tabaci.	Enema of Tobacco.
℞ Tabaci, drachmam,	Take of Tobacco, a drachm,
Aquæ ferventis, octarium;	Boiling Water, a pint;
Macera per horam et cola.	Macerate for an hour, and strain.

"Much caution," says Dr. Thomson, "is required in using this powerful sedative enema; if it depress too much, solution of ammonia and brandy should be freely administered." It is strange that tobacco clysters were at one time commonly recommended in cases of suspended animation from drowning.

TAMARINDUS (Arab. *Tamar*). *Leguminis pulpa.* The pulp of the pods of Tamarind. *Tamarindus Indica.* *Cl.* 16. *Ord.* 1. Monadelphia Triandria. *Nat. Ord.* Leguminosæ.

This tree is a native of the East and West Indies, America, Egypt, and Arabia. It is tall and branching, with a thick erect trunk and rough gray bark. The leaves are pinnate, consisting of several pairs of small sessile leaflets, bright green, downy, entire, oblong, and obtuse; the flowers are in lateral clusters; the calyx is yellow and deciduous; the petals yellow, variegated with red veins; they are ovate, concave, acute, and indented; the filaments are purple, with incumbent brown anthers; the germen oblong and compressed, and the style terminated by an obtuse stigma; the pod is roundish, compressed, three to five inches long, and contains several seeds, lodged in a pulpy matter.

The West Indian tamarinds are generally preserved in casks of syrup; the East Indian are darker, dry, and without sugar; the former are an agreeable sweetmeat, and the latter chiefly used for culinary purposes.

Tamarinds allay thirst in febrile affections, and, if largely eaten, operate upon the bowels, and generally gripe. In preparing *pulp of tamarinds*, or in preserving them with sugar, copper vessels should be avoided.

According to Vauquelin, 100 parts of the pulp of tamarinds contain—

Tartaric acid	1·5
Bitartrate of potassa	3·2
Citric acid	9·4
Malic acid	0·4
Vegetable jelly	6·2
Sugar	12·5
Gum	4·7
Fibre and lignin	30·5
Water	31·6
	100

TARAXACUM (*ταρασσειν, to disturb*, or *alter*). Dandelion. *Radix.* The root of *Leontodon Taraxacum.* *Cl.* 19. *Ord.* 1. Syngenesia Æqualis. *Nat. Ord.* Cichoraceæ. (*Taraxacum Dens Leonis.* Lindley. *Flora Medica*).

"Root tap-shaped, very milky, externally black, difficult of extirpation. Leaves numerous, spreading, of a bright shining green, quite smooth, tapering downwards, sessile, pinnatifid, with sharp unequally-toothed lobes, pointing downwards, or, in botanical language, runcinate, of which these leaves are a perfect example. Scapes one or more, longer than the leaves, erect, smooth, brittle, naked. Flower-heads an inch and a-half wide, of an uniform golden yellow, expanded in the morning and in fine weather only. Outer scales of the involucre several, linear-oblong, loosely recurved and wavy. As the fruit ripens, the involucre becomes reflexed close to the stalk, leaving the light globe, near two inches in diameter, formed by their radiating pappus, quite exposed till dispersed by the winds." (*Smith.*)

The only officinal formula of this root is the following:—

Extractum Taraxaci.	Extract of Taraxacum.
℞ Taraxaci, libras duas cum semisse,	Take of Taraxacum Root, two pounds and a-half,
Aquæ destillatæ ferventis, congios duos:	Boiling distilled Water, two gallons;
Macera per horas viginti quatuor, tum decoque ad congium, et liquorem adhuc calentem cola; denique ad idoneam crassitudinem consume.	Macerate for twenty-four hours, then boil down to a gallon, and strain the liquor whilst hot; lastly, evaporate to a proper consistence.

A decoction of dandelion has long been used as a diet-drink, in liver complaints and some other chronic visceral affections: it is diuretic, diaphoretic, and slightly aperient. In certain cases of dyspepsia, benefit is said to result from the use of this medicine in large doses. Dr. W. Philip says, "it is best adapted to those cases in which the bile is deficient or much disordered, while the power of the stomach is still considerable." (*On Indigestion.*)

In the treatment of chronic inflammation of the liver, the late Dr. Pemberton speaks highly of taraxacum, and recommends its trial in incipient scirrhus, and several chronic derangements of the stomach. (*On Diseases of the Abdominal Viscera.*)

It is also employed as an alterative in cutaneous eruptions; but in such cases its medical efficacy is equivocal. It often happens, however, that during the use of diet-drinks, and analogous remedies, more attention is paid to the state of the stomach and bowels, and food is abstained from which is rich and greasy, or otherwise disagreeing with the stomach, in order that the alterative plan may not be interfered with; hence it is that the mere putting the patient upon a system which makes him more attentive to the state of the *primæ viæ* is useful in the removal of many complaints.

Extract of Taraxacum generally has a sweet taste, and is readily soluble in water: but Mr. Squire, who has paid much attention to this and other extracts, informs me that, when cautiously prepared, and not unnecessarily exposed to the action of air, the extract is bitter, and that, when sweet, the medical efficacy of the remedy is impaired. It may be given in doses of half a drachm, or more, four or six times a day, dissolved in some aromatic water, a form preferable to that of pill. It may safely be prescribed as an alterative in cutaneous affections, and in those derangements of general health which are accompanied by obscure hepatic symptoms, and in which the usual treatment is ineffectual. Taraxacum is thought well of by several foreign writers of eminence, and is by them generally recommended in the form of liquid extract, or, as it is sometimes termed, *Mellago Taraxaci;* the expressed juice of the fresh root is also used in the dose of two fluid ounces every morning, with an equal quantity of milk.

According to John, the juice of taraxacum contains bitter extractive, caoutchouc, traces of resin, sugar, gum, a free acid, and sulphate, muriate, and phosphate of potassa and lime. For the following particulars respecting this root and its extract, I am indebted to Mr. Squire.

" Fresh taraxacum root, when crushed and submitted to pressure, varies exceedingly, even in the same week, in the produce of extract, without any material difference being discernible in the root itself; and the average results of each month, taken separately, show a marked difference in the strength of the juice at different seasons. In the winter months, when it should be dug up for medicinal use, the fresh root loses, on drying, 75 per cent. of water. This root, washed, crushed, and pressed, will yield half its weight of dark juice, which coagulates, and becomes of a fawn-colour. It yields, on evaporation, 25 per cent. of extract; but, if the expressed roots be further digested, more extract is obtained.

At different seasons of the year, *one pound* of extract is afforded by the following proportions of the expressed juice, namely,

January and February 4 to 5lbs. of juice = 1lb. of extract.
March . . . . 6 to 7lbs. of juice = 1lb. of extract.
April, May . . . . 8 to 9lbs. of juice = 1lb. of extract, and during these months, the juice is so aqueous, that it does not coagulate spontaneously, as it does during the preceding months.

June, July, August . 6 to 7lbs. of juice = 1lb. of extract, and now it again coagulates; the old roots are spongy, and the new ones very slender.

In September and October 4 to 5lbs. of juice = 1lb. of extract.
In November and December 4lbs. of juice = 1lb. of extract.

During November and December the root is in the most vigorous condition, and most abundant in those ingredients upon which its medicinal powers depend. Frost has a singular effect upon the growing roots, causing the bitterness to decrease, and sweetness to take its place; it is also observable that, on the disappearance of the frost, the bitter returns in a stronger degree, and the sweetness disappears.

The *dark* extract of the shops owes its sweetness to a curious change in the juice during evaporation; and if this process be much protracted, acetic acid is formed, which imparts to the extract a sensible acidity. When carefully prepared, extract of taraxacum is of a brown colour, has a sensibly bitter taste, and a peculiar aroma, but it is not sweet.

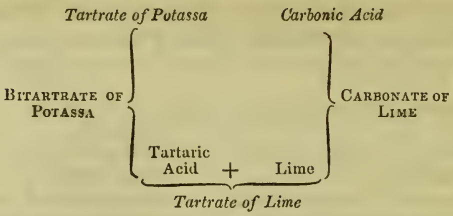
From the chemical examination which Mr. Squire has made of the expressed juice of the root of taraxacum, it appears to contain gum, albumen and gluten, an odorous principle, extractive, and a peculiar crystallisable bitter principle, soluble in alcohol and water.

TARTARIC ACID. *Acidum Tartaricum.* This, and the *Citric acid*, ought to have had a place in the list of the Materia Medica, as they are exclusively supplied by the wholesale manufacturer, for medical use. The following is the formula of the Pharmacopœia:—

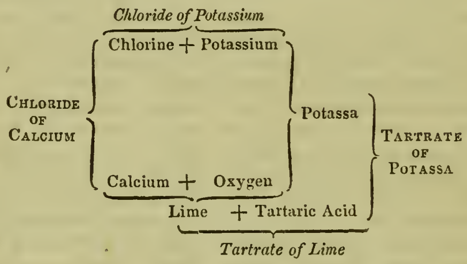
ACIDUM TARTARICUM.	TARTARIC ACID.
℞ Potassæ Bitartratis, libras quatuor,	Take of Bitartrate of Potassa, four pounds,
Aquæ destillatæ ferventis, congios duos cum semisse,	Boiling distilled Water, two gallons and a-half,
Cretæ præparatæ, uncias viginti quinque et drachmas sex,	Prepared Chalk, twenty-five ounces and six drachms,
Acidi Sulphurici diluti, octarios septem et fluiduncias septemdecim,	Diluted Sulphuric Acid, seven pints and seventeen fluid ounces,
Acidi Hydrochlorici, fluiduncias viginti sex cum semisse, vel quantum satìs sit;	Hydrochloric Acid, twenty-six fluid ounces and a-half, or as much as may be required;
Potassæ bitartratem cum aquæ destillatæ congiis duobus coque et adde paulatim cretæ præparatæ dimidiam partem; deinde, peractâ effervescentiâ, reliquam cretam adjice in acido hydrochlorico cum aquæ destillatæ octariis quatuor priùs liquatam. Denique sepone ut subsidat calcis tartras; liquorem effunde et calcis tartratem aquâ destillatâ sæpiùs lava, donec saporis expers sit. Tum superinfunde acidum sulphuricum dilutum, et per quartam horæ partem coque. Liquorem colatum leni calore consume, ut fiant crystalli.	Boil the bitartrate of Potassa with two gallons of the distilled water, and add, gradually, half of the prepared chalk; afterwards, the effervescence having ceased, add the remainder of the chalk, first dissolved in the hydrochloric acid, with four pints of the distilled water. Lastly, set by, that the tartrate of lime may subside; pour off the liquor, and wash the tartrate of lime frequently with distilled water till it is free from taste. Then pour on it the diluted sulphuric acid, and boil them for a quarter of an hour. Evaporate the strained liquor with a gentle heat, that crystals may be formed.
Crystallos, ut puræ sint, iterùm et tertiò in aquâ liqua, eamque totiès cola, decoque, et sepone.	Dissolve the crystals, that they may be pure, again, and a third time in water, and strain, boil down, and set aside to crystallise as often.
NOTA.	NOTE.
ACIDUM TARTARICUM (*crystalli*). In aquâ penitûs liquatur. Hic liquor ex quovis potassæ sale neutro, bitartratem potassæ demittit. Quod ex hac liquore a plumbi acetate demittitur, id ab acido nitrico diluto dissolvitur.	TARTARIC ACID (*crystals*). Totally soluble in water. This solution throws down bitartrate of potassa from any neutral salt of potassa. Whatever is precipitated from this solution by acetate of lead, is soluble in dilute nitric acid.

If sulphuric acid, or a sulphate, were present, the precipitate thrown down by acetate of lead would contain sulphate of lead, and would not be entirely redissolved by nitric acid.

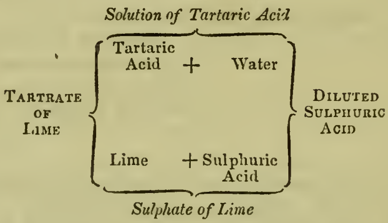
The composition of *bitartrate of potassa* has already been stated (see page 449). In the above process, the tartaric acid of the bitartrate is converted by two operations into tartrate of lime, and the tartrate of lime is afterwards decomposed by the dilute sulphuric acid. When half of the prepared chalk or carbonate of lime above directed, is added to the bitartrate of potassa, one atom of tartaric acid unites to one atom of lime, expelling the carbonic acid, and forms tartrate of lime, which falls in the state of a white precipitate, and neutral tartrate of potassa remains in solution. These changes are shown in the following diagram:—



The remaining chalk is then dissolved in the hydrochloric acid, and affords a solution of chloride of calcium, which, added to the *neutral* tartrate of potassa, furnishes, by double decomposition, another proportional of tartrate of lime, in consequence of the changes shown in the following diagram:—



These two proportionals of tartrate of lime are then decomposed by diluted sulphuric acid, as represented below:—



The solution of tartaric acid is then evaporated till it crystallises, and the crystals are perfected and purified by repeated solutions and evaporations. Unless, however, the acid is made upon a large scale, and whitened by filtration through pure animal charcoal, the crystals are small, imperfect, and discoloured.

The crystalline forms of tartaric acid are various and difficultly determined, being derived, according to Mr. Phillips, from a *primary* oblique rhombic prism. The crystals are permanent in the air, and require for their solution about six parts of water at 60°. Like the other vegetable acid solutions, this becomes mouldy when kept, and its ultimate elements form new secondary compounds. When tartaric acid is fused, it forms, on cooling, a deliquescent semitransparent mass, and, at a higher temperature, produces *pyrotartaric acid*. These changes have lately been investigated in detail by M. Edmond Tremy (*Ann. de Chim. et. Phys.*, LXVIII., 353), and are extremely curious, but have at present no bearing upon pharmaceutical chemistry. The equivalent of tartaric acid in its anhydrous state, as it exists in combination with bases, is 66, and its elements are—

	Atoms.	Equivalents.	Per Cent.
Carbon	4	24	36·4
Hydrogen	2	2	3·0
Ogygen	5	40	60·6
Anhydrous Tartaric Acid	1	66	100·0

Its ordinary crystals include an atom of water, and consist of—

	Atoms.	Equivalents.	Per Cent.
Anhydrous Tartaric Acid	1	66	88
Water	1	9	12
Crystallised Tartaric Acid	1	75	100

According to Hermbstadt, tartaric acid may be economically manufactured from the juice of sour grapes, thirty-six ounces of which afford about two and a-half ounces of the acid.

Tartaric acid may be used in the formation of refrigerant drinks; and, as it does not deliquesce by exposure to air, it is generally employed in the preparation of the effervescent powders used as substitutes for soda water. For this purpose the tartaric acid should be powdered, and dried in a gentle heat; it should then be mixed in proper proportions with powdered bicarbonate of potassa, or sesquicarbonate of soda, and kept in well-corked phials: a tea-spoonful stirred into a small tumbler of cold water, affords a pleasant effervescent draught, and is a good vehicle for some of the saline aperients. These effervescing draughts, when they contain excess of acid, are often effectual in removing a tendency in the urine to deposit the ammonio-magnesian phosphate, especially where water saturated with carbonic acid cannot be procured; if merely neutral, they have, when persevered in, a contrary or alkaline effect on the urine.

TEREBINTHINA CANADENSIS (*τερεβινθος*, the turpentine tree; probably from *τερειν*, *to wound*, or *bore*). Canada Turpentine. *Resina liquida.* The liquid resin of the *Pinus Balsamea. Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Pinaceæ, or Coniferæ. (*Abies Balsamea.* LINDLEY, *Flora Medica.*)

This species of fir (Balm of Gilead fir) is a native of the northern parts of North America, flowering in May. " It is a straight elegant tree, rarely exceeding forty feet in height, and twelve or fifteen inches in diameter, covered with a smooth whitish-gray bark. The leaves are in double rows, like a comb, short, not exceeding eight inches in length, and linear, bright green on the upper surface, marked with whitish lines underneath, and fragrant; the cones, which ripen in October, stand erect on the branches, are large, nearly cylindrical, of a beautiful deep glossy purple colour, inclining to black, and exude a great quantity of transparent resin, which gives them a very rich beautiful appearance." (*Lond. Disp.*)

Canada turpentine, or balsam, is obtained by incisions into the body of this tree; like the other turpentines, it is a compound of volatile oil and two resins. It has a pale-yellow colour, is transparent, very viscid, fragrant, and warm and bitter to the taste. It is diuretic and stimulant, but is never, or scarcely ever, used in medicine, and need not have been retained in the Pharmacopœia. It is a valuable ingredient in varnishes, giving them toughness without impairing their transparency.

TEREBINTHINA CHIA. Cyprus or Chian Turpentine. *Resina liquida.* The liquid resin of *Pistacia Terebinthus.* *Cl.* 22. *Ord.* 5. Diœcia Pentandria. *Nat. Ord.* Anacardiaceæ.

This, which is a small tree, is a native of Syria and the Greek Archipelago; it much resembles the *Pistacia Vera*, the fruit of which is commonly known under the name of pistacio-nuts. The leaflets seven to nine, oval, lanceolate, acute, smooth, entire, deep green, shining above, and whitish beneath. The scales from amongst which the male flowers escape are closely covered with brown hairs. Fruit purple, almost round, small. Cyprus turpentine is obtained from the trunk by incision. When pure, this is very thick, yellowish, sweet-scented, resembling lemon or fennel in some degree, with an agreeable and by no means acrid taste. Follicular horn-like galls, are produced on this species in the South of Europe, which have been used, according to Clusius, in the manufacture of a "sanative and glutinous balsam" (*Lindley*).

Cyprus turpentine is generally adulterated with common turpentine; but, when pure, it is not applicable to any important medical uses.

TEREBINTHINA VULGARIS. *Common Turpentine.* The liquid resin of the *Pinus Silvestris.* Scotch Fir. (See page 413).

Common turpentine is obtained by incision; it is a viscid substance, of a grayish-yellow colour, a slight terebinthinate odour, and a warm and bitterish flavour. When distilled with water, the volatile oil called *essence*, or *oil of turpentine*, passes over, and *yellow resin* remains (p. 456).

Oil of Turpentine has a peculiar odour, and a warm and somewhat aromatic, but not agreeable flavour. In its ordinary state it contains impurities, from which it may be freed by agitation with quick lime and digestion over chloride of calcium; its specific gravity is then 0·860, and its boiling point 312°; the density of its vapour 4·740. It is composed of,

	Atoms.	Equivalents.	Per Cent.
Carbon	10	60	88·1
Hydrogen	8	8	11·9
Oil of Turpentine	1	68	100·0

The relation of this oil to camphor has been already stated (*see* Camphora, p. 141). It is highly inflammable, and when long exposed to air, absorbs oxygen, and becomes changed in its properties; it absorbs chlorine and hydrochloric acid, and forms, with the latter, the curious compound formerly called *artificial camphor.*

The following are the only officinal formulæ of the present Pharmacopœia in which oil of turpentine is used:—

Enema Terebinthinæ.	Enema of Turpentine.
℞ Terebinthinæ Olei, fluidunciam,	Take of Oil of Turpentine, a fluid ounce,
Vitelli ovi quod satis sit; tere simul et adde	Yolk of Egg, as much as may be sufficient; rub them together, and add
Decocti Hordei, fluiduncias novendecim;	Decoction of Barley, nineteen fluid ounces;
Misce.	Mix.

Linimentum Terebinthinæ.	Liniment of Turpentine.
℞ Saponis mollis, uncias duas,	Take of Soft Soap, two ounces,
Camphoræ, unciam,	Camphor, an ounce,
Terebinthinæ Olei, fluiduncias sedecim;	Oil of Turpentine, sixteen fluid ounces;
Agita simul, donec misceantur.	Agitate them together till they are mixed.

In small doses, oil of turpentine is a stimulating diuretic, and as such is prescribed in gleets and similar cases in which copaiba is used; sometimes it is useful in urinary sand, but in general it irritates the kidneys and disorders the stomach, when exhibited in such cases. In chronic rheumatism it is occasionally an effective stimulant, and deserves trial in obstinate cases. It is the most certain of the anthelmintics, especially in the expulsion of tape-worm; in such cases it requires to be given in large doses, repeated night and morning till the bowels are evacuated and the worm dislodged; and should the second dose not operate, some castor oil should be given to aid its purgative powers. It is remarkable that, in these large doses, oil of turpentine rarely proves to any extent diuretic, though it communicates to the urine the violet odour peculiar to the turpentines. It usually nauseates and excites eructations from the stomach, headach, giddiness, and sometimes vomiting. Dr. Paris advises large doses of oil of turpentine in certain cases of obstinate constipation, depending upon affections of the brain; Dr. Latham found it useful in epilepsy; and a singular case of locked jaw in an hysterical young woman, cured by a clyster of oil of turpentine, is related in the *Medico-Chirurgical Transactions*, by Dr. E. Philips, vol. VI., p. 65. In some cases of constipation it has been used as an enema, in the proportion of an ounce, rubbed with the yolks of two eggs, and diffused through a pint of thin starch, or according to the above officinal formula. As a stimulant, oil of turpentine is applied in liniments, blended with camphor, ammonia, and other rubefacients; applied to bleeding vessels, it often operates as an effectual styptic. The stimulating application sold under the name of *Whitehead's Essence of Mustard*, is composed of camphor and oil of rosemary, dissolved in oil of turpentine, with a little flour of mustard added to it. Dropped into the ear, diluted, if requisite, with a little olive oil, it relieves deafness from deficient ceruminous secretion.

When the object is to employ oil of turpentine as a diuretic and diaphoretic in gleets and chronic rheumatism, the dose is from ten to thirty or forty minims; it may be rubbed with a little mucilage of gum arabic, honey, or yolk of egg, and diffused through ten drachms or an ounce and a-half of any aromatic water. When administered for the expulsion of the tape-worm, from half an ounce to an ounce is the usual dose. It may be swallowed without inconvenience, merely floating upon an ounce or two of water. In these cases, two, three, or even four ounces have been given without further inconvenience than headach and exhilaration, succeeded by more or less nausea, and in some persons by an erythematic eruption. The worm is generally, but not always, voided dead.

The *Linimentum Terebinthinæ* is a valuable application to extensive burns and scalds; it was first employed by Dr. Kentish, (*Essay on Burns*) and subsequent experience has amply proved its utility. He recommends the parts to be immediately bathed with warm oil of turpentine, and then covered with plasters thickly spread with the above liniment. Wine, opium, and cordials are at the same time administered: the subsequent treatment consisted in the use of aperients, and the application of mild emollient dressings.

Whenever oil of turpentine is used, it must be cautiously employed in the neighbourhood of flame or fire, in consequence of its great and ready inflammability.

TESTÆ. The shells of the *Ostrea Edulis.* Oyster shells.

The varieties of shell have been shown by Mr. Hatchett, to consist of carbonate of lime, with a variable proportion of animal matter, which is gelatinous or membranous in the porcellaneous shells, but albuminous or cartilaginous in the mother-of-pearl shells. It was formerly customary to employ many varieties of carbonate of lime derived from such sources, but *prepared chalk* may in all cases be used as a substitute; why therefore are oyster-shells retained in the present Materia Medica?

TIGLII OLEUM. *Oleum e seminibus expressum.* The expressed oil of the seeds of *Croton Tiglium. Cl.* 21. *Ord.* 8. Monœcia Monadelphia. *Nat. Ord.* Euphorbiaceæ.

This species of Croton is a native of the continent of India, and Ceylon. It is a middle-sized tree. "Young branches terete, smooth, shining, a little furrowed towards the ends. Leaves oval-oblong, acute and three to five nerved at the base, acuminate at the point, with shallow glandular serratures; thin, membranous, with two glands at their base, covered when young with extremely minute stellate scattered hairs; petioles channelled, about one-fourth the length of the leaf, when quite young furnished with stellate hairs, but soon losing them. Racemes terminal, erect, male at apex, female below. Flowers (male) downy. Calyx five-cleft, petals five, lanceolate, woolly; stamens fifteen, distinct. Female, calyx five-cleft, permanent, styles long, bifid. Capsules oblong, obtusely triangular, the size of a hazel nut, closely covered with minute stellate hairs: the cells completely filled with the solitary seeds. Skin of the seeds pale dull brown, overlaying a harder dark integument." (Lindley. *Flora Medica.*)

According to Brandes (*Journ. de Pharm.* xi.) Croton seeds contain the following proximate principles; a volatile oil, crotonic acid, an alkaloid, colouring matter, stearin, wax, resin, inulin, gum, gluten, tragacanthin, albumen, starch, and phosphate of magnesia. We are indebted to Dr. Nimmo of Glasgow for some valuable facts respecting the composition and uses of these seeds and their oil. (*Quart. Journ.* XIII.) He found 100 parts of the seeds to consist of sixty-four of kernel, and thirty-six of shell; the latter yielded a brown but inert tincture with alcohol; the former, or the kernel of the seed, yielded sixty parts of expressed oily matter, and forty of insoluble and farinaceous matter; the oil contained forty-five parts of acrid purgative principle, soluble in spirit of wine, and fifty-five of fixed oil. The active principle of Croton seeds appears to be of a resinous nature (crotonic acid?) and is soluble in alcohol, ether, and oils; the residuary fixed oil is medicinally inert. As it is probable that Croton oil is often adulterated with common fixed oils, Dr. Nimmo suggests the following test of its purity: "Let a very light phial be counterpoised in an accurate balance; pour into it fifty grains, or more, of the Croton oil, add alcohol which has been digested upon olive oil, of which it dissolves so little as not to injure, in the smallest degree, the alcoholic solution for subsequent use; agitate well, pour off the solution, and add more alcohol in the same manner, until the dissolved portion is diffused in such a proportion of alcohol that each half-drachm measure shall contain equal to one dose of the Croton oil for an adult: by placing the phial near a fire to evaporate what remains of the alcohol in the bottle, if the remainder be to that which has been abstracted by the alcohol as fifty-five to forty-five, the oil is genuine; if olive, or any other oil, little soluble in alcohol, has been added, the residuum will be larger in proportion. But if Castor oil has been employed, the proportion of the residue will be smaller than in the genuine medicine." This test is founded upon the insolubility of the inert portion of genuine Croton oil, in alcohol already saturated by olive oil; such alcohol however readily dissolves that portion of the genuine Croton oil, in which its activity resides.

Every part of the Croton plant is purgative, but the seeds especially so, and were formerly employed under the name of *Molucca grains.* The expressed oil has been re-introduced as a powerful cathartic, in cases of obstinate and protracted constipation, or where a violent evacuator is required, as in some cases of apoplexy and injury of the brain, and in certain convulsive, hypochondriac, and maniacal affections. The average dose for an adult is one or at the utmost two drops; and perhaps the best, or at least the most active, form for exhibiting it, is in a pill with bread crumb; it may also be rubbed with mucilage, and so diffused in half an ounce or an ounce of any aromatic water; the violence of its operation is somewhat diminished by this dilution.

℞ Mucil. Acaciæ ʒj.
Ol. Tiglii gutta una; tere simul et adde
Aquæ Menthæ viridis fʒvj.
M. fiat haustus purgans.

This quantity sometimes proves violently operative, emptying the bowels completely of their contents, and exciting a copious watery secretion from them. Larger doses have been given without effect, but this remedy should always be administered with the utmost caution. It should also be remembered that different samples of the oil differ extremely in activity.

Dr. Nimmo prefers the alcoholic tincture of the oil, of such strength that the half drachm is equivalent to a drop of the oil; the following is the formula which he directs.

℞ Tincturæ (Croton) Olei Tiglii fʒss.
Syrup.
Misturæ Acaciæ āā fʒij.
Aquæ destillatæ f℥ss. fiat haustus.
After swallowing a little milk, take the draught very quickly, and wash it down with the same diluent.

Having administered it in more than a hundred cases, Dr. Nimmo states that in not more than four was vomiting produced, and that, not violent; in not many more was nausea felt; in all, purging was induced in from half an hour to three hours; the purgative effects were generally moderate, and rarely accompanied with griping. It is recommended by Dr. Nimmo as a hydragogue cathartic in ascites, and as a powerful auxiliary to opium in delirium tremens; he also gave it with success in some cases of jaundice, in an obstinate case of tympanitis, and in excessive corpulence." In India, where it has long been used, ghee or butter, with orange or rice water, or cold butter-milk, and the external affusion of cold water, are employed to counteract its too violent effects, when these occur. It is also used in India as an emmenagogue with excellent effects; and as an external application in rheumatic affections. Diluted with two parts of olive oil, it produces an eruption of small pustules on the skin, and thence operates as a counter-irritant. In some instances the undiluted oil is used for this purpose. (*London Disp.*) I should consider the latter application as very hazardous. It is said that forty of the seeds will kill a horse in seven hours, and Rumphius states that they are a common poison among the natives of Amboyna.

TIN, *see* STANNUM.

TINCTURÆ. *Tinctures.*

Tincturæ quælibet in vasis vitreis clausis præparari, et inter macerandum sæpius agitari debent.	All tinctures should be prepared in stopped glass vessels, and frequently shaken during maceration.

With the exception of those which contain very active ingredients, tinctures are not important preparations; and though extensively employed, are not indispensable; so that in hospitals and situations where, economy is an object, their place may be supplied by cheaper and more simple formulæ. Tinctures consist of solutions of different substances in rectified spirit, either pure or more or less diluted, *proof spirit* being employed in by far the greater number of instances. In the present Pharmacopœia they are directed to be prepared at the common temperature of the atmosphere, and the usual time allowed for maceration is fourteen days. At the end of that period the tinctures should be poured off, and pressed out of the residuary ingredients, and the whole filtered, and put away for use. They are sometimes carelessly suffered to remain upon the dregs, portions being from time to time decanted off for use, so that at different times their strengths vary; in respect to some of them, such want of uniformity may be productive of very serious consequences.

With few exceptions the tinctures are permanent compounds, and in well-closed vessels have no tendency to change their appearance or activity: a few of them are liable to unimportant alterations, and several deposit a portion of their contents when subjected to temperatures lower considerably than those at which they were originally prepared. In their preservation, therefore, uniformity of temperature should not be overlooked, and hence a cellar is the properest place in which to keep them in store. Where they are made upon a very large scale, they may be prepared in vessels of stone-ware, and in some cases, of tinned copper.

The following is a list of the *tinctures* included in the present Pharmacopœia :—

Tinctura Aloes	Tincture of Aloes, *see* ALOES.
Tinctura Aloes Composita	Tincture of Aloes (compound), *see* ALOES.
Tinctura Ammoniæ Composita	Tincture of Ammonia (compound), *see* AMMONIA.
Tinctura Assafœtidæ	Tincture of Assafœtida, *see* ASSAFŒTIDA.
Tinctura Aurantii	Tincture of Orange-peel, *see* AURANTIUM.
Tinctura Balsami Tolutani	Tincture of Tolu Balsam, *see* BALSAMUM.
Tinctura Benzoini Composita	Tincture of Benzoin (compound), *see* BENZOINUM.
Tinctura Calumbæ	Tincture of Calumba, *see* CALUMBA.
Tinctura Camphoræ	Tincture of Camphor, *see* CAMPHORA.
Tinctura Camphoræ Composita	Tincture of Camphor (compound), *see* CAMPHORA.
Tinctura Cantharidis	Tincture of Cantharides, *see* CANTHARIDES.
Tinctura Capsici	Tincture of Capsicum, *see* CAPSICUM.
Tinctura Cardamomi	Tincture of Cardamoms, *see* CARDAMOMUM.
Tinctura Cardamomi Composita	Tincture of Cardamoms, (compound), *see* CARDAMOMUM.
Tinctura Cascarillæ	Tincture of Cascarilla, *see* CASCARILLA.
Tinctura Castorei	Tincture of Castor, *see* CASTOREUM.
Tinctura Catechu	Tincture of Catechu, *see* CATECHU.
Tinctura Cinchonæ	Tincture of Cinchona, *see* CINCHONA.
Tinctura Cinchonæ Composita	Tincture of Cinchona (compound), *see* CINCHONA.
Tinctura Cinnamomi	Tincture of Cinnamon, *see* CINNAMOMUM.
Tinctura Cinnamomi Composita	Tincture of Cinnamon (compound), *see* CINNAMOMUM.
Tinctura Colchici	Tincture of Colchicum, *see* COLCHICUM.
Tinctura Colchici Composita	Tincture of Colchicum (compound), *see* COLCHICUM.
Tinctura Conii	Tincture of Hemlock, *see* CONIUM.
Tinctura Cubebæ	Tincture of Cubebs, *see* CUBEBA.
Tinctura Digitalis	Tincture of Foxglove, *see* DIGITALIS.
Tinctura Gallæ	Tincture of Galls *see* GALLÆ.
Tinctura Gentianæ Composita	Tincture of GENTIAN (compound), *see* GENTIANA.
Tinctura Guaiaci	Tincture of Guaiacum, *see* GUAIACUM.
Tinctura Guaiaci Composita	Tincture of Guaiacum (compound), *see* GUAIACUM.

Tinctura Hellebori . . .	Tincture of Hellebore, *see* HELLEBORUS.
Tinctura Hyoscyami . .	Tincture of Henbane, *see* HYOSCYAMUS.
Tinctura Jalapæ . . .	Tincture of Jalap, *see* JALAPA.
Tinctura Iodinii Composita .	Tincture of Iodine (compound), *see* IODINIUM.
Tinctura Kino . . .	Tincture of KINO, *see* KINO.
Tinctura Lavandulæ Composita	Tincture of Lavender (compound), *see* LAVANDULA.
Tinctura Lupuli . . .	Tincture of Hops, *see* LUPULUS.
Tinctura Myrrhæ . . .	Tincture of Myrrh, *see* MYRRHA.
Tinctura Opii . . .	Tincture of Opium, *see* OPIUM.
Tinctura Rhei Composita .	Tincture of Rhubarb (compound), *see* RHEUM.
Tinctura Scillæ . . .	Tincture of Squill, *see* SCILLA.
Tinctura Sennæ Composita .	Tincture of Senna (compound), *see* SENNA.
Tinctura Serpentariæ . .	Tincture of Serpentaria, *see* SERPENTARIA.
Tinctura Valerianæ . .	Tincture of Valerian, *see* VALERIANA.
Tinctura Valerianæ Composita	Tincture of Valerian (compound), *see* VALERIANA.
Tinctura Zingiberis . .	Tincture of Ginger, *see* ZINGIBER.

TONICS (*τὸνος*, *tone*, from *τεινω*, *I stretch*, or *tighten*). Medicines which restore or strengthen the impaired powers of the muscular fibre, giving what is called tone to the system. Bitter and astringent vegetable substances, the salts of iron, and those of a few other metals, and some of the acids, come under the denomination of *tonic remedies.*

TORMENTILLA. *Radix.* The root of *Potentilla Tormentilla. Cl.* 12. *Ord.* 5. Icosandria Polygynia. *Nat. Ord.* Rosaceæ.

This plant is common in dry pastures, and on heaths; it flowers about June. The root is perennial, thick, roundish, irregularly conical, and covered with dark brown bark: the interior is dense and reddish; it sends forth many stems, which grow a few inches high; they are round, slender, firm, hairy, and branched towards the top. The leaves are nearly sessile, ternate, lanceolate, serrated, and hairy: the flowers are on long, opposite, solitary, one-flowered peduncles: the calyx consists of ovate, hairy segments, alternately large and small: the petals are yellow; they have short claws, and are obcordate: the seeds are few and wrinkled.

Tormentil root is a powerful astringent, and may be substituted for many other analogous remedies: with the exception of galls and catechu it is more abundant in tannin than any article of the Materia Medica. It may be given in substance in doses of thirty or forty grains, or it may be used in infusion or decoction. It is effectual in the treatment of diarrhœa, and may be prescribed in all cases where a pure astringent is required; it may also be employed as a gargle in ulcerations of the mouth, and as an astringent lotion or injection.

DECOCTUM TORMENTILLÆ.	DECOCTION OF TORMENTILLA.
℞ Tormentillæ contusæ uncias duas,	Take of Tormentilla root bruised two ounces,
Aquæ destillatæ octarium cum semisse;	Distilled water a pint and a half;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

TOXICODENDRON (*τοξικον, poison*, *δενδρον, tree*). Poison Ivy. Poison Oak. Poison Sumach. *Folia.* The leaves of *Rhus Toxicodendron. Cl.* 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Anacardiaceæ.

This plant is common in woods in the United States. "It is a creeping shrub with long chord-like shoots, emitting strong lateral fibres. Leaves ternate, on long semicylindrical petioles. Leaflets ovate, or rhomboidal acute, smooth and shining on both sides, the veins sometimes a little hairy beneath. The margin is sometimes entire, and sometimes variously toothed and lobed in the same plant. Flowers small, greenish-white. They grow in panicles or compound racemes, in the sides of the new shoots, and are chiefly axillary. The barren flowers have a calyx of five erect acute segments, and a corolla of five oblong recurved petals. Stamens erect, with oblong anthers. In the centre is a rudiment of a style. The fertile flowers, situated on a different plant, are about half the size of the preceding. The calyx and corolla are similar but more erect. They have five small abortive stamens, and a roundish ovary surmounted with a short, erect style, ending in three stigmas. The berries are roundish and of a pale-green colour, approaching to white." (*Lindley.*)

This plant abounds in a milky juice, which blackens by exposure to air, and may be used as an indelible marking-ink upon linen. It is acrid and poisonous, and is said to emit a highly deleterious vapour. Dr. Lindley says that its exhalations are extremely poisonous to many persons, but not to all. "They bring on itching, redness, and tumefaction of the affected parts, particularly of the face, succeeded by blisters, suppuration, aggravated swelling, heat, pain, and fever. Symptoms, which, though often highly distressing, are rarely fatal. It is employed in powder, infusion, and extract, internally in certain diseases. Dr. Horsfield administered it with success in the dose of a tea-cup of the infusion to consumptive and anasarcous patients; it has been employed with supposed benefit in consumption, and is well spoken of in cases of herpetic eruption, palsy, mania, and paralysis." (*Flora Medica.*)

The statements respecting the virtues of this plant are eminently contradictory, and I believe no correct analysis has hitherto been made of it. According to Van Mons it contains tannin, gallic acid, resin, gum, green fæcula, and "abundance of an inflammable hydrocarbon." (*Ann. de Chim.* xxxv. 106.) The dried leaves, and the extract prepared from them, are stated by Merat and Lens (*Dictionnaire de Mat. Méd.*) to be inert, and the extract prepared in Carolina not to be depended on. "The leaves are inodorous and have a mawkish subacrid taste. Their virtues are completely extracted by water, and partially by alcohol. The aqueous infusion reddens litmus paper, precipitates the solution of sulphate of iron black, that of nitrate of silver brown, and throws down a precipitate with gelatin. Hence it contains gum, resin, gallic acid, and tannin; but a narcotic principle is also present, on which its effects principally depend." (*Dr. A. T. Thomson.*)

Dr. Alderson of Hull treated cases of paralysis successfully with this remedy; he gave an infusion of the fresh leaves, in the proportion of half an ounce to a pint of water; he recommends it in all diseases of debility. Some have preferred the powder in the dose of from one to four or five grains every six hours; but almost all authorities agree in representing the virtues as much impaired by drying. The leaves are scarcely ever to be had in the shops, and when found, are generally old and dusty, and certainly not to be depended on.

TRAGACANTHA (*τραγος, goat, ακανθος, thorn:* its pods are supposed to resemble a goat's beard?) *Succus concretus.* The concrete juice of *Astragalus verus. Cl.* 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Fabaceæ or Leguminosæ.

Tragacanth is probably furnished by more than one species of *Astragalus.* The *A. verus* is a native of Persia: it is scarcely three feet high, and its stem is about an inch thick: it has numerous crowded branches, covered with scales and spines: the leaves are about half an inch long, and are composed of several pairs of opposite, villous, pointed leaflets, the midrib being terminated by a sharp point: the flowers, which are small and yellow, proceed from the axillæ of the leaves. The corolla is papilionaceous, and five-toothed. Ovary villous. Legumes woolly.

The gum is chiefly produced in Persia, and exported from Aleppo. The best is in the form of white, semitransparent, contorted, and vermiform pieces, not readily soluble in water, but softening and swelling like cherry-tree gum. The yellow, brown, and dirty varieties, should be rejected. As an article of the Materia Medica, its virtues nearly resemble those of gum Arabic, to which it is preferred for many pharmaceutical purposes, as forming a more tenacious mucilage. When carefully dried, it admits of reduction to powder.

According to Bucholz, 100 parts of fine tragacanth consist of—

Bassorin (Cerasin of other writers)	43
Common gum	57
	100

Guerin-Varry gives as its components—

Water	11·1
Ashes	2·5
Arabin	53·3
Bassorin and starch	33·1
	100·0

PULVIS TRAGACANTHÆ COMPOSITUS.	COMPOUND POWDER OF TRAGACANTH.
℞ Tragacanthæ contritæ,	Take of Tragacanth in powder,
Acaciæ contritæ,	Gum Acacia in powder,
Amyli, singulorum unciam cum semisse,	Starch, of each an ounce and a half,
Sacchari, uncias tres;	Sugar, three ounces;
Amylum et saccharum simul in pulverem tere; tum adjectis tragacanthâ et acaciâ, omnia misce.	Rub the sugar and the starch together into powder, then, the tragacanth and acacia being added, mix all together.

This inert mucilaginous powder is a good vehicle for more active remedies, and for their administration in small and divided doses; in this way it is a useful accompaniment to calomel. In the dose of half a drachm to a drachm and a half it is sometimes prescribed to allay the tickling of common coughs. With the addition of five grains of nitre it is supposed to diminish the irritation of gonorrhœa.

TURMERIC, *see* CURCUMA.

TURNSOLE, *see* LACMUS.

TURPENTINE (*Terpentine*), *see* TEREBINTHINA.

TUSSILAGO (from *tussis*, a cough: in reference to its pectoral powers. It is the *βηχιον*, [from *βηξ*, *tussis*,] of Dioscorides). Common Coltsfoot. *Tussilago Farfara. Cl.* 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Compositæ. (Asteraceæ. *Lindley.*)

Coltsfoot is a native of various parts of Europe, the Crimea, Persia, Siberia, the East Indies, from the sea-shore to elevations of nearly 8000 feet. Rhizoma mucilaginous, bitterish, creeping horizontally, with many fibres. Flower-heads coming before the leaves; drooping in the bud, bright yellow, about an inch broad; the rays spreading, copious, very narrow. Each flower-head on a simple, round, woolly, radical stalk, scaly, with numerous reddish, smooth, scattered bracteas, crowded under the head, like an exterior involucre. Leaves erect, on furrowed channelled footstalks, heart-shaped, slightly lobed, copiously and sharply toothed; very smooth, of a slightly-glaucous green above; pure white, and densely cottony, with prominent veins, beneath; when young, they are revolute, and thickly enveloped in cottony down (*Lindley*).

When this plant is used, the leaves are the part preferred; they yield a mucilaginous, and slightly-aromatic bitterish decoction, which is taken sweetened with honey. Cullen recommended the use of the leaves as an alterative in scrofula, but little reliance is placed at present in any of the supposed virtues of coltsfoot. It was formerly smoked through a reed, or as tobacco, for the relief of asthma, and those affections which have been termed obstructions of the chest. " A vile stimulant nostrum consisting, according to Dr. Paris (*Pharmacologia*), of *equal parts of balsam of tolu, compound tincture of benzoin, and double the quantity of rectified spirit of wine*, is sold under the name of *Essence of Coltsfoot*, as a remedy for cough."(*Lond. Disp.*)

VALERIANA (from *Valerius*, who first described it). *Radix.* The root of *Valeriana officinalis. Cl.* 3. *Ord.* 1. Triandria Monogynia. *Nat. Ord.* Valerianaceæ.

Common valerian is found in wet places over the whole of Europe; that which grows in dry pastures is preferred for medical use. The root is tuberous and creeping. Stem about four feet high and furrowed. Leaves pinnate; leaflets coarsely serrated, those of the radical leaves broadest, approaching to ovate. Panicles cymose, contracted. Bracteolæ ovate-lanceolate, acuminate, herbaceous, membranous at the edge, appressed, rather longer than the ovary. Calyx superior, rolled inwards in the form of a rounded, thickened rim. Corolla white, funnel-shaped, smooth; the tube gibbous at the base on that side of the flower turned away from the axis; hairy internally: limb spreading, divided into five nearly equal, concave, linear, rounded lobes. Stamens three, exserted, white, from the middle of the tube of the corolla. Ovary inferior; narrow-oblong, compressed, one-celled, with a single pendulous ovule; style filiform; stigma divided into three filiform lobes. Fruit light-brown, linear-ovate, compressed, with a slightly-elevated ridge on the side, terminated by the permanent calyx, whose limb has unrolled into twelve filiform plumose recurved segments, crowning it like a pappus. (Lindley. *Flora Medica.*)

According to Trommsdorff, 100 parts of dry valerian root contain—

Aromatic volatile oil	1·2
Peculiar resinous extractive	12·5
Gummy extract and starch	9·4
Resin	6·2
Woody fibre	70·7
	100·0

The following are the officinal preparations of valerian contained in the *London Pharmacopœia.*

Infusum Valerianæ.	Infusion of Valerian.
℞ Valerianæ, semunciam,	Take of Valerian (root), half an ounce,
Aquæ destillatæ ferventis, octarium;	Boiling distilled Water, a pint;
Macera per horam dimidiam, in vase levitèr clauso, et cola.	Macerate for half an hour in a lightly-closed vessel, and strain.

Tinctura Valerianæ.	Tincture of Valerian.
℞ Valerianæ contusæ, uncias quinque,	Take of Valerian (root), bruised, five ounces,
Spiritûs tenuioris, octarios duos;	Proof Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

Tinctura Valerianæ Composita.	Compound Tincture of Valerian.
℞ Valerianæ contusæ, uncias quinque,	Take of Valerian (root), bruised, five ounces,
Spiritûs Ammoniæ aromatici, octarios duos;	Aromatic Spirit of Ammonia, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

Valerian was first brought into estimation by Fabius Colonna, about the year 1592, having relieved, but not cured himself of epilepsy by it. Its singular and fetid odour, so enticing to cats, has given it celebrity in some nervous and hysterical affections. Its taste is warm and bitter, and it imparts its virtues to water, so that it may be administered in infusion or decoction; but its flavour is impaired by long boiling. As an antispasmodic and tonic, in some nervous affections and morbid irritability, valerian is certainly useful; upon the same principle, it is a good adjunct to cinchona in those stages of the typhoid and nervous fevers where that remedy is indicated: it has also been recommended in hypochondriasis.

Speaking of the use of valerian as a nervous tonic, Dr. Heberden says, "It has often been given without much apparent effect; but yet I have met with some whom it threw into such agitations and hurries of spirits, as plainly showed that it is by no means powerless. Most cats are fond of gnawing it, and seem to be almost intoxicated by it into outrageous playfulness; and the nerves of cats afford a very tender test of the powers which any substances possess of affecting the nerves. The poisoned darts of the Indians, tobacco, opium, brandy, and all the inebriating nervous poisons, are far more sensibly felt by this animal than by any other that I know of an equal size."

"The aromatic, or rather fetid roots, are stimulant, not only acting upon the secretions, but producing a specific influence over the cerebro-spinal system, bringing on, as is well known, a kind of intoxication in cats, and in large doses occasioning in man, scintillations, agitation, and even convulsions. It is chiefly employed in asthenic fevers, epilepsy, chorea, hysteria, and as an anthelmintic." (*Lindley*).

The *infusion* is the best form for its administration, which may be given in ounce-and-a-half or two-ounce doses, conjoined with a drachm of either of the tinctures. A very strong, or saturated, alcoholic tincture is a good form, in the dose of one, two, or three drachms, in peppermint, mint, or pennyroyal water; it may be conjoined with camphor, ammonia, and other nervine stimulants. It contains so large a proportion of inert woody fibre that the powdered root cannot be regarded as an eligible form for its administration, though it has been occcasionally preferred by those who have had much experience of its efficacy. (*See* Merat et Lens. *Dictionnaire.*)

VEGETABILIA. *Vegetables.*

Decerpenda sunt Vegetabilia, tempestate siccâ, nec imbribus, nec rore madefacta; quotannis colligenda sunt, et quæ diutiùs servata fuerint rejicienda.	Vegetables are to be collected in dry weather, when they are neither wet from showers nor dew; they are to be collected annually, and those which have been kept longer than a year are to be rejected.
Radices pleræque effodiendæ sunt antequam caules aut folia exserant.	Most roots are to be dug up before the stalks or leaves shoot forth.
Cortices colligi debent eâ tempestate, quâ facillimè a ligno separari possint.	Barks ought to be collected at that season when they can be most easily separated from the wood.
Folia decerpenda sunt postquam flores expassi fuerint: et antequam semina maturuerint.	Leaves are to be gathered after the flowers are blown; and before the seeds ripen.
Flores legendi sunt nuper explicati.	Flowers are to be gathered recently blown.
Semina colligenda sunt jam matura, in propriis pericarpiis servanda.	Seeds are to be collected as soon as they are ripe, and should be kept in their own seed-vessels.

VEGETABILIUM PRÆPARATIO.	PREPARATION OF VEGETABLES.
Vegetabilia, brevi postquam decerpta fuerint, illis exceptis quæ recentia esse oportet, leviter strata, quam citissimè	Vegetables, shortly after they are gathered, excepting those which ought to be used fresh, should be lightly spread,

leni calore exsicca; dein in vasis idoneis, intercluso luminis et humoris accessu, conserva.

Radices, quas recentes servari præcepimus, in arenâ siccâ reconde. Colchici Cormum et Scillæ Bulbum ante exsiccationem, tunicis aridis direptis, transversim in laminas tenues seca.

Fructus pulposos, si immaturi sint, vel maturi et sicci, sepone in loco humido, ut mollescant; dein pulpas per cribrum setaceum exprime; postea coque lento igne, crebrò movens; denique aquam balneo aquoso consume, donec pulpæ fiant idoneæ crassitudinis.

Cassiæ Leguminibus contusis Aquam ferventem superinfunde, ut pulpa eluatur, quam per cribrum rarum grandioribus foraminibus primùm exprime, postea per setaceum; deinde aquam balneo aquoso consume, donec pulpa idoneam crassitudinem habeat.

Fructuum maturorum et recentium pulpam vel succum per cribrum exprime, nullâ coctione adhibitâ.

Gummi-Resinæ.

Opium a rebus alienis, præsertim externis, quam diligentissimè separa. Servetur Opium molle, quod ad pilulas fingendas aptum sit, et durum, quod balneo aquoso ita exsiccatum fuerit, ut in pulverem teri possit.

Gummi-Resinæ pro optimis habendæ sunt, quæ veniunt adeo sinceræ, ut nullâ purificatione opus sit. Quæ vero minùs puræ esse videantur, in Aquâ coquendæ sunt, donec mollescant, et prelo exprimendæ per pannum cannabinum; dein seponendæ ut pars resinosa subsidat. Liquorem supernatantem effusum balneo aquoso consume, adjectâ sub finem parte resinosâ, quæ cum parte gummosâ in unum coëat.

Ut purificentur Gummi-Resinæ facilè liquescentes, vesicâ bubulâ inclusæ in aquâ fervente teneantur donec adeò molles fiant, ut per pannum cannabinum a sordibus prelo separari possint.

Styracem in Spiritu rectificato liqua, et cola; tum leni calore destillet Spiritus, donec idonea crassitudo fiat.

and dried as quickly as possible, with a gentle heat: they should then be kept in convenient vessels, excluded from access of light and moisture.

Lay up those roots, which we have directed to be kept fresh, in dry sand. Cut the Cormus of Meadow Saffron, and the bulb of Squill, before drying, into thin transverse slices, previously peeling off the dry layers.

Put pulpy fruits, if unripe, or if ripe and dry, in a moist place to soften; then press the pulps through a hair-sieve; boil them afterwards over a slow fire, frequently stirring; lastly, evaporate the water in a water-bath until the pulps become of a proper consistency.

Pour boiling water upon the bruised pods of Cassia, so that the pulp may be washed out; press this first through a coarse sieve, and afterwards through a hair-sieve; then evaporate the water on a water-bath, until the pulp has a proper consistency.

Of fruits that are ripe and fresh, press the pulp or juice through a sieve, without boiling.

Gum-Resins.

Separate Opium very carefully from extraneous substances, especially from those which are external. Let Opium be kept *soft*, fit to form pills; and *hard*, which has been so dried on a water-bath, that it may be reduced to powder.

Those Gum-Resins are to be preferred, which can be selected so clean as to require no purification. But those which appear to be less pure, are to be boiled in water until they soften, and squeezed in a press through a hempen cloth; then to be set by, that the resinous part may subside. The supernatant liquor being poured off, evaporate it in a water-bath, the resinous part being added towards the end, that it may unite with the gummy parts, and towards the end of the evaporation mix the resinous part intimately with the gummy.

The easily-fusible Gum-Resins may be purified by putting them into an ox-bladder, and keeping them in boiling water until they become soft enough to be separated from their impurities by pressing through a hempen cloth.

Dissolve Styrax in rectified Spirit, and strain; then let the Spirit distil over by a gentle heat until it has acquired a proper consistence.

Such are the general instructions given in the Pharmacopœia, respecting the collection, preservation, and purification of vegetable products. The directions in the first paragraph are essentially the same as, though less concise than, the following, which were long ago laid down by Linnæus (See *Pharmacopœia Batava*). They involve some important considerations connected with the growth and functions of plants, or with *vegetable physiology*, a branch of study too much neglected by, but of great interest and value to the medical student.

1. Radices sub veris initium antequam folia prorumpunt effodiendæ.
2. Herbæ decerpendæ cùm flores formantur.
3. Flores prius legendi quam pollen antherarum demittunt.
4. Stipites autumno, quo potiori vi animantur, desumendæ.
5. Turiones colligendi, antequam eorum folia se explicuerint.
6. Cortices ex fructibus autumnali tempore, ex arboribus autem vernali separandi.
7. Ligna potissimùm tempore hyemali abscindenda.
8. Fructus plerumque colligendi postquam maturuere.

Quod radicum collectionem attinet, semper attendamus ad vegetationem plantæ propriam, atque ex hâc dijudicemus tempus eas eruendi. Earum bonitas in primis dignoscitur ex cortice et parenchymate. Radices plantarum annuarum maximè evellantur, stirpe jam adultâ, antequam flores ferunt, biennium autumno ejus anni quo seminatæ sunt, decrescente, vel vere proximo. Ceteroquin plantis quibus vivax per plures annos radix inhæret, hanc auferamus, quùm primo vere gemmæ turgere, vel folia, si hæc hyeme decidunt, se explicare videntur. Nec obliviscamur, plures plantas culturâ inefficaciores fieri, ut conium maculatum, quasdam contrà tempore virtute augeri.—(*Pharmacopœia Batava, editore J. F. Niemann*, vol. i. p. 347.)

The propriety of rejecting the generality of vegetables collected in the preceding year, is too often unattended to by the wholesale venders to whom apothecaries generally resort for their supplies. In many articles, odour and acrimony are greatly impaired by age, and their virtue is diminished or lost; hence dangerous uncertainties result from their employment: as in regard to hemlock, henbane, foxglove, &c.

Roots are ordered to be dug up when their proper juices are most perfect, and before they are consumed in the changes which ensue during the growth of the stem and leaves. They may often, with equal propriety, be collected early in the winter, before the stems have entirely withered away.

Barks are directed to be taken at that season when they most easily separate from the wood; that is, with few exceptions, late in the spring or early in summer; at that time they abound most in the secretions of the individual tree: at a later period the *liber* or inner layer of bark becomes converted into wood, the properties of the bark are impaired, and it is with difficulty removed from the tree.

Leaves are in perfection at the time of the flowering of the plant; at that period they are found to contain their characteristic products in the greatest abundance; they should be perfectly formed, and not beginning to wither, which they often do, when the seeds are about to ripen.

Flowers should, for the same reason, be gathered soon after they expand, and before the pollen falls from their anthers.

Seeds may often be preserved in their pods, but this is sometimes inconvenient, from the bulk or liability to moulder of the seed-vessel. Some seeds may be long kept without deterioration, especially those which abound in volatile oil; they even retain their vegetative powers for years: others become rancid, often in a few months, especially those in which fixed oils predominate. Seeds that are abundant in mucilage are liable to the attacks of insects and to decay from moisture.

There appears to be no general connexion in the virtues of different parts of plants. In trees, the active principles are commonly most abundant in the bark, for it is there that the perfect sap, after it has been exposed to light and air in the leaves, chiefly deposits the peculiar secretions of the vegetable. This deposition principally goes on in the spring and early part of the summer; hence the propriety of collecting barks at that time of year. The astringency of the oak, the aroma and bitterness of cascarilla, the salifiable principles of the various species of cinchona, and the bitterness of cusparia, are all found in their respective barks, which, therefore, are the parts directed for use.

In herbaceous plants the most active principles are frequently concentrated in the roots, as in gentian, jalap, liquorice, hellebore, rhubarb, &c. In other cases the roots are inactive, and the virtue resides in the leaves, as of hemlock, digitalis, senna, savine, &c. In others the seeds partake of some activity, as those of colchicum; while the seeds of the poppy are inert. The aroma of these plants is usually associated with the essential oil of the leaves, flowers, or fruit and seeds, as in mint, lavender and chamomile, in the orange and lemon, and in caraways, cardamoms, &c.

Medicinal virtue or activity seldom pervades every part of the plant: that part, therefore, in which it is chiefly found, and from which it is most easily obtained, should be selected as officinal; and the Materia Medica should not be encumbered with inert, uncertain, and redundant articles.

There are several important points respecting the preparation of vegetable bodies, which are either unnoticed, or too briefly adverted to in the above-quoted directions of the Pharmacopœia.

The temperature at which vegetable substances are dried for pharmaceutical use should rarely fall short of 100°, nor should it exceed 212°. The heat of steam is preferable to any other, as, under common pressure, it can rarely injure the vegetable; whereas drying stoves heated by flues, are liable to become so hot as to parch and decompose substances that are merely intended to be dried. In constructing drying stoves, great attention should be paid to their *ventilation;* currents of fresh and warmed air should be abundantly admitted from below, and there should be apertures above to carry off the heated air and the vapour from the articles that are drying. In some few instances, drying in the open air and sunshine is to be preferred; but light bleaches and probably affects the efficacy of some plants.

If roots are to be preserved fresh, moist, and not dry sand is the best material to bury them in. The cormus of colchicum should be cut into *thin slices*, and carefully dried. Squills should be cut transversely into very thin slices, and rapidly but cautiously dried until they become brittle. The dried bulb should be kept in a dry and warm place, for in a damp air it becomes tough and mouldy, and loses much of its acrimony; this also happens to powdered squill, which should be used freshly pulverised, and should be prepared in small quantities at a time; or, if in larger, should be excluded from air and moisture.

The pulps of fruits retained in the Pharmacopœia, are those of the tamarind and cassia-pod, of the dog-rose, and of prunes: to none of these, nor indeed to any others, can the directions of the Pharmacopœia be applied. The usual mode of obtaining the pulps of such fruits as have become dry, consists in softening them by exposure to steam, or by a small quantity of boiling water, until they admit of being rubbed through a proper sieve; in short, they are to be treated nearly in the same way as is directed for the extraction of the pulp of cassia-pods.

Opium, and some other substances not strictly belonging to the gum-resins, are included under that head. When opium has been cleansed from adhering substances, it should be dried in a temperature below 212°, until it no longer loses weight; it then becomes sufficiently *hard* to admit of being powdered and sifted, in which state *only* it should be used for pharmaceutical preparations and medical prescriptions. In the *soft* state, the quantity of water is very variable, and affects the dose of an article of so much activity. In prescribing opium in pills, therefore, it is better to use it in powder, than to rely upon the *opium molle.*

The GUM-RESINS, directed for medical use in the present Pharmacopœia are *Ammoniacum*, *Assafœtida*, *Gamboge*, *Euphorbium*, *Galbanum*, *Myrrh*, *Olibanum*, *Opoponax*, *Sagapenum*, and *Scammony;* these may generally be procured sufficiently free from impurities for medical use; but as the virtues of several of them depend principally upon the volatile oil which they contain, the process of softening them in boiling water until they admit of being pressed through hempen cloth would obviously injure them; while upon others such a process cannot be performed, as they are hardened by the above temperature. Under this head, however, the directions of the Pharmacopœia are not sufficiently explicit. The best mode of cleansing ammoniacum, assafœtida, and galbanum, is to pulverise and sift them in cold weather; the powder afterwards agglutinates, which is of no consequence. The *boiling in the bladder* should above all things be disallowed.

Styrax is rarely to be found, except in the cabinets of the curious: when pure, it requires no purification; and when impure the process above directed is inefficient.

VERATRUM. *Radix.* The root of White Hellebore, *Veratrum album. Cl.* 23. *Ord.* 1. Polygamia Monœcia. *Nat. Ord.* Melanthaceæ.

This plant is found in meadows in the south of Europe, from Spain to the Caucasus. The root is perennial, fleshy, and fusiform, beset with strong fibres gathered into a head; the stem is thick, round, hairy, erect, three to four feet high, and branching. The leaves are oblong-ovate, about ten inches long and five broad in the middle, plaited longitudinally, embracing the stem at the base, and of a yellowish-green colour. The flowers are in long terminal spikes, composed of small alternate spikelets, each accompanied with a lanceolate bracte. The flower consists of six persistent petals of a pale-green colour; three of them oblong and lanceolate, with a membranous edge; and three calycinal, which enclose the other three in the bud, one-half shorter, and heart-shaped, with a small point at the top. The filaments closely surround the germen, diverge and bend down at the summit, and are terminated by yellow quadrangular anthers; the germens are three in each hermaphrodite flower, oblong, with erect, bifid, hairy styles, crowned with flat spreading stigmas; the capsules contain many compressed membranous seeds. (*Lond. Disp.*)

The proximate principles of the root of white hellebore are stated by Pelletier and Caventou to be elain, stearin, gallate of veratria, yellow colouring matter, starch, gum, and lignin. The preparation and properties of *Veratria* have been already described (*see* SABADILLA).

The fresh root has a peculiar nauseous odour, and a bitter pungent taste. The dried root is inodorous and less acrid. The following are the officinal preparations:—

DECOCTUM VERATRI.	DECOCTION OF WHITE HELLEBORE.
℞ Veratri contusi, drachmas decem,	Take of White Hellebore, bruised, ten drachms,
Aquæ destillatæ, octarios duos,	Distilled Water, two pints,
Spiritûs rectificati, fluiduncias tres;	Rectified Spirit, three fluid ounces;
Decoque veratrum ex aquâ ad octarium, et ubi refrixerit, adjice spiritum, tum exprime et cola.	Boil the hellebore in the water down to a pint, and when it has cooled, add the spirit, then press and strain.

UNGUENTUM VERATRI.	OINTMENT OF WHITE HELLEBORE.
℞ Veratri contriti, uncias duas,	Take of White Hellebore, powdered, two ounces,
Adipis, uncias octo,	Lard, eight ounces,
Limonum Olei, minima viginti;	Oil of Lemons, twenty minims;
Misce.	Mix.

VINUM VERATRI.	WINE OF WHITE HELLEBORE.
℞ Veratri concisi, uncias octo,	Take of White Hellebore, sliced, eight ounces,
Vini Xerici, octarios duos;	Sherry Wine, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

When white hellebore is administered internally, its operation is extremely violent; it purges and vomits even in small doses, and in larger ones excites fainting, convulsions, and excessive and dangerous debility. Although, therefore, it has been prescribed in some cases of mania, of epilepsy, and paralysis, the uncertainty of its effect has induced most practitioners to reject it. The dose of the *Vinum Veratri* is ten minims, gradually increased if required. It may be given in any aromatic water. Powdered white hellebore is sometimes used, diluted with inert powders, as a sternutatory in paralytic affections, and especially in gutta serena; but it is not preferable to other safer remedies. The *decoction* is occasionally prescribed as a lotion in scabies and some other eruptive disorders; and it is a favourite ingredient in the washes used by cattle-doctors. It often proves, however, even in this way, dangerously active.

The *ointment* has been recommended for the cure of scabies, when the odour of sulphur is objected to; it requires caution in its use.

The best account of the *poisonous effects* of veratrum is contained in a thesis by Dr. Schabel, published at Tübingen, in 1817. "Collecting together the experiments previously made by Wepfer, Courten, Viborg, and Orfila, and adding a number of excellent experiments of his own, he infers that it is poisonous to animals of all classes; horses, dogs, cats, rabbits, jackdaws, starlings, frogs, snails, and flies; that it acts in whatever way it is introduced into the system; by the stomach, rectum, windpipe, nostrils, pleural membrane of the chest, an external wound, or the veins; that it produces in every instance symptoms of irritation in the alimentary canal, and injury of the nervous system; and that it is very active, three grains applied to the nostrils of a cat having killed it in sixteen hours." (*Christison.*)

There is an account in *Rust's Magazine* (xiv., 547) of a family of eight persons poisoned by eating bread for a whole week, in which the powder of white hellebore had been accidentally introduced. They were severally attacked with pains in the abdomen, a sensation as if the intestines were wound up into a clue, giddiness, and soreness of the mouth. They all recovered by the use of laxatives. The following cases are also quoted by Dr. Christison. Three people took the root by mistake. The symptoms that ensued were very characteristic of its double action. In an hour they had burning in the throat and stomach, followed by nausea, dysuria, and vomiting; weakness and stiffness of the limbs; giddiness, blindness, and dilated pupil; great faintness, convulsive breathing, and small pulse. One of them, an elderly woman, who took the largest share, had an imperceptible pulse, stertorous breathing, and total insensibility even to ammonia held under the nose. Next day she continued lethargic, complained of head-ach, and had an eruption like flea-bites. These persons recovered (HORN's *Archiven*). Bernt quotes a fatal case from *Schuster's Medical Journal.* "A man took twice as much as could be held on the point of a knife, was attacked with violent and incessant vomiting, and lived only from the morning till night. The gullet, stomach, and colon, were here and there inflamed." One of the best antidotes for this poisoning is said to be a strong infusion of galls.

VINA. *Wines.*

Vina medicata in vasis vitreis clausis præparari, et inter macerandum sæpius agitari debent.	Medicated wines should be prepared in stopped glass vessels, and frequently shaken during maceration.

The following are the *Medicated Wines*, or *Vinous Tinctures* of the present Pharmacopœia; they are all directed to be prepared with *Sherry*, and to be macerated for fourteen days:

Vinum Aloes	Wine of Aloes, *see* Aloes.
Vinum Colchici	Wine of Colchicum, *see* Colchicum.
Vinum Ipecacuanhæ	Wine of Ipecacuanha, *see* Ipecacuanha.
Vinum Opii	Wine of Opium, *see* Opium.
Vinum Veratri	Wine of White Hellebore, *see* Veratrum.

VINUM XERICUM. *Sherry Wine.*

This is the only wine which is retained in the present Pharmacopœia, and is one of the best for the preparation of vinous tinctures, being what is usually termed a strong dry wine. It is not, however, to be presumed, that genuine sherry will ever be wasted upon these formulæ; the article usually sold under the name of *sherry* being a mixture of Marsala, Cape, and other cheap white wines, either pale, golden, or brown, according to the proportion of burned sugar with which it is tinted; it is, however, generally, what is called in the trade a *sound wine*, not readily susceptible of acetous fermentation, and of a quality not ill adapted for medication.

The medicinal and therapeutic uses of wine correspond more or less with those of spirituous liquors generally (see page 25). Their relative *strength* may be judged of from the following table, but as their employment as medicines is also dependent upon their relative *acidity*, and occasionally upon other peculiarities, I shall subjoin a few further remarks upon the principal varieties.

Table, showing the Quantity of Alcohol (of the Specific Gravity of 0·825 at 60°) contained in the principal varieties of Wine, Beer, and Spirits. (See *Philosophical Transactions*, 1811).

	Proportion of Spirit per cent. by measure.		Proportion of Spirit per cent. by measure.
1. Lissa	26·47	6. Currant wine	20·55
Ditto	24·35	7. Sherry	19·81
Average	25·41	Ditto	19·83
2. Raisin wine	26·40	Ditto	18·79
Ditto	25·77	Ditto	18·25
Ditto	23·20	Average	19·17
Average	25·12	8. Teneriffe	19·79
3. Marsala	26·03	9. Colares	19·75
Ditto	25·05	10. Lachryma Christi	19·70
Average	25·09	11. Constantia, white	19·75
4. Port	25·83	12. Constantia, red	18·92
Ditto	24·29	13. Lisbon	18·94
Ditto	23·71	14. Malaga (1666)	18·94
Ditto	23·39	15. Bucellas	18·49
Ditto	22·30	16. Red Madeira	22·30
Ditto	21·40	Ditto	18·40
Ditto	19·00	Average	20·35
Average	22·96	17. Cape Muscat	18·25
5. Madeira	24·42	18. Cape Madeira	22·94
Ditto	23·93	Ditto	20·50
Ditto (Sercial)	21·40	Ditto	18·11
Ditto	19·24	Average	20·51
Average	22·27		

		Proportion of Spirit per cent. by measure.
19.	Grape wine	18·11
20.	Calcavella	19·20
	Ditto	18·10
	Average	18·65
21.	Vidonia	19·25
22.	Alba Flora	17·26
23.	Malaga	17·26
24.	White Hermitage	17·43
25.	Roussillon	19·00
	Ditto	17·26
	Average	18·13
26.	Claret	17·11
	Ditto	16·32
	Ditto	14·08
	Ditto	12·91
	Average	15·10
27.	Zante	17·05
28.	Malmsey Madeira	16·40
29.	Lunel	15·52
30.	Sheraz	15·52
31.	Syracuse	15·28
32,	Sauterne	14·22
33.	Burgundy	16·60
	Ditto	15·22
	Ditto	14·53
	Ditto	11·95
	Average	14·57
34.	Hock	14·37
	Ditto	13·00
	Ditto (old in cask)	8·88
	Average	12·08
35.	Nice	14·63
36.	Barsac	13·86
37.	Tent	13·30
38.	Champagne (still)	13·80
	Ditto (sparkling)	12·80

		Proportion of Spirit per cent. by measure.
	Ditto (red)	12·56
	Ditto (ditto)	11·30
	Average	12·61
39.	Red Hermitage	12·32
40.	Vin de Grave	13·94
	Ditto	12·80
	Average	13·37
41.	Frontignac	12·79
42.	Côte Rôtie	12·32
43.	Gooseberry wine	11·84
44.	Orange wine,—average of six samples made by a London manufacturer	11·26
45.	Tokay	9·88
46.	Elder wine	8·79
47.	Cider, highest average	9·87
	Ditto	5·21
48.	Perry, average of four samples	7·26
49.	Mead	7·32
50.	Ale (Burton)	8·88
	Ditto (Edinburgh)	6·20
	Ditto (Dorchester	5·56
	Average	6·87
51.	Brown stout	6·80
52.	London porter (average)	4·20
53.	Ditto small beer (ditto)	1·28
54.	Brandy	53·39
55.	Rum	53·68
56.	Gin	51·60
57.	Scotch Whisky	54·32
58.	Irish ditto	53·90

Of the wines in the above list, the strongest, and especially Port, Sherry, and Madeira, are those in most common use in this country.

Port, in its new and unadulterated state, is a rough, strong, and somewhat sweet wine; but when duly kept in bottle, it gradually deposits a considerable portion of its astringent and extractive matter, loses the greater part of its sweetness, acquires an improved flavour, and retains its strength. Various proportions of brandy are almost always added to port wine before it comes to this country, to which much of its heat upon the palate, and powerfully stimulating effect upon the constitution, must be ascribed, when taken in its new state. If too long kept in bottle, nearly the whole of its colouring and astringent matters are deposited; it loses flavour, and becomes less agreeable, both to the palate and stomach.

Good port wine, duly kept, is, when taken in moderation, one of the most wholesome of vinous liquors; it strengthens the muscular system, assists the digestive powers, accelerates the circulation, exhilarates the spirits, and sharpens the mental energies. Indulged in excess, it is perhaps the most mischievous of the wines, and most likely to produce those permanent derangements of the digestive organs, that obtuse state of the faculties of the mind, and those obstinate organic affections, which follow the habitual use of the stronger spirituous liquors.

Madeira, as a stimulant, rivals port. It generally agrees with the stomach, and, when in fine condition, is a perfect and excellent wine, particularly adapted to the resuscitation of debilitated constitutions, and to the excitement of the nervous system in typhoid weakness. But, unfortunately, good Madeira wine is rarely to be procured; it is no longer made of the same quality as formerly, and the trade overflows with a variety of inferior and mixed wines, of all prices and denominations, to which the name of Madeira is most undeservingly applied. In its purest form, Madeira is somewhat more acid than either port or sherry, and is consequently not so well adapted to stomachs inclined to dyspeptic acidity, where it is often complained of as peculiarly heating and irritating.

Sherry is a fine and wholesome wine, and when of a due age and in good condition, free from excess of acid matter, and possessing a dry aromatic flavour and fragrancy, which renders it a fit stimulant for delicate stomachs; as such, it is a valuable article of the Materia Medica. But, as procured in the ordinary market, it is of most fluctuating quality, very often destitute of all aroma, tasting of little else than alcohol and water, and more or less coloured to suit the fancy of the purchaser.

The quantity of these wines, which may be taken with impunity, and the proportion requisite to fulfil certain indications in disease, is greatly dependent upon their quality; and they accordingly either produce the genial effects of genuine fermented liquors, or the febrile excitement of the products of the still, even when taken in due moderation. Thus it is, that a single glass of tavern wine often heats and creates headache, and disturbs digestion, in persons who are not habitually accustomed to the compounds which, at such places, frequently bear the name of wine. Such effects are sometimes so marked as to be referred to pernicious adulterations of the liquor; but, in the samples of wine, of suspected purity, which I have examined, I never found any poisonous ingredient; and though lead, in minute quantities, may often be detected in wines, it is derived from shot in the bottle, or some analogous source, and is most evident in that wine which is most acid, and consequently has the greatest tendency to oxidize and dissolve the lead. In one instance I detected arsenic in a bottle of sherry, but it was confined to the single bottle, and traced to a cattle-lotion which it had previously contained. The prevalent custom of putting wine into washed bottles which have not previously contained it, cannot be too carefully avoided.

French wines, in delicacy of flavour and care in manufacture, exceed all others. Among these, *Burgundy*, and the various branches of that family, are peculiarly heating and soporific; and, when new, two or three glasses frequently excite a considerable degree of temporary fever, attended by a full and hard pulse, flushed face, and headach; but the symptoms soon subside, and are followed by no inconvenience. These wines, however, should be cautiously indulged in by all persons in whom suddenly-increased vascular action is liable to produce anything more than temporary effect. Burgundy is a wine not less celebrated for the exquisite delicacy of its flavour and odour, than for the uncertainty with which it retains them. Sometimes it preserves its excellence unimpaired for many years; at others it becomes insipid, vapid, discoloured, and decomposed, in as many months. Any sudden change of temperature is particularly inimical to this wine, which should always be preserved in a *cool* but not a *cold* cellar; and, for the same reason, it should be transported from one country to the other in very temperate weather, the thermometer ranging between 50° and 60°.

The *Wines of Bordeaux* are distinguished by a delicacy of flavour, and by a more perceptible combination of the acid with the vinous flavour (though quite independent of acescency), than is perceived in most other genuine vinous liquors: they are less heating and more aperient than other wines, and agree well with the stomach when taken in moderation; if in excess, they excite acidity and indigestion, often rather from the quantity than quality. But some of the *Clarets* of our wine-merchants are very substantial wines, being compounded in various ways for the English market; they are thus often mixed with Hermitage, and with raspberry brandy: if procured through doubtful channels, as we find them at taverns, they are too frequently acescent, and apparently composed of some claret mixed with faded port, or other spoiled wines. The clarets, however, derived from respectable sources, are agreeable and comparatively harmless wines; they are moderately exhilarant, and have a tendency to relax the bowels and increase the flow of urine: they are the wines fitted for those persons who are easily excited, and in whom the stronger wines readily produce febrile action; and in that state of the system which is connected with a tendency in the urine to deposit white sand, a state which some physicians have denominated the *phosphatic diathesis*, claret is sometimes an effective remedy.

Hermitage, especially the *red*, *Côte-rôtie*, *Roussillon*, and a few other wines of rare occurrence, occupy a place intermediate between port and claret, considered as to strength, and often also in regard to flavour. These wines require age; and Roussillon, if originally of fine quality, is not in perfection unless it has been ten or twelve years in bottle.

Champagne wines admit of division into two classes, the sweet and sparkling, and the dry and still. These differences arise partly from the mode of managing the fermentation and bottling of the wine, and partly from the circumstance of the growth and situation of the vines; the sunny side of a hill yielding fruit fit for the production of the sweet wine, and the opposite aspect affording grapes calculated for the manufacture of a strong but dry wine. The effervescent varieties of champagne, if not taken in excess, are the most speedily exhilarating of all wines; they soon produce an approach to intoxication, which is very transient, and generally harmless; but indulged in to any excess, their effects are more than ordinarily pernicious, and they then stand unrivalled in the headach, nausea, sickness, and universal derangement of the system, which they create. In habits tending to the formation of uric acid, and in constitutions subject to *red* deposits in the urine, or to affections of a gouty character, champagne, even in moderation, is certainly more apt than other wines to create painful sensations in the region of the kidneys, and in the small joints of the hands and feet. It is well known to have brought on fits of gravel and of gout; yet are there some gouty persons who indulge in champagne with at least temporary impunity, though in all such cases prudence forbids its use. So many persons complain of headach, even after a single glass of good champagne, that it should be interdicted wherever there is a tendency to such affections, from whatever cause they may arise.

Still champagne is often a strong and heating wine, very deceitful in these respects to the palate. When of superior quality, it has the singular aromatic flavour of champagne in an eminent degree, a flavour which also exists, but is covered by carbonic acid, in the sparkling wine. The latter should, therefore, not be drunk till the active effervescence has subsided, by those who would relish this characteristic quality. The prevalent notion that a glass of champagne cannot be too quickly swallowed, is very erroneous, and shows great want of taste in respect to the peculiar excellence of this wine; to such persons a glass of perry or of gooseberry wine is as acceptable as one of champagne; further, it is no bad test of the goodness of sparkling champagne to leave it exposed for some hours in a wine-glass, when, if originally of the higher order, it will be found to have lost its excess of carbonic acid, but to retain its characteristic flavour. The coloured champagnes are usually tinted with cochineal, and there are several other varieties of this wine which require no particular notice; many of them, though genuine, are of a very inferior description, and quite deficient in *bouquet* and flavour.

The class of *sweet wines* or *vins de liqueur*, as the French term them, require little notice in this place, being rarely taken in doses exceeding one, or at the utmost two small glasses. Many of them are potent, aromatic, and cordial; they are generally more agreeable to the palate than the stomach, with which they usually disagree, if indulged in beyond the usually prescribed quantity.

A variety of wines are made in Italy, and in the more southern parts of Europe, which, however, are of rare occurrence, and chiefly found at the tables of the curious. Of these some few are of excellent quality, but in general they are carelessly made, and, from inattention to cleanliness and to the state of the fruit, they are of inferior or even disagreeable flavour. With the exception of *Constantia*, the wines imported from the Cape of Good Hope are also defective in the most essential qualities of good wine.

Among the *home-made wines*, a few are drinkable, and many might be considerably improved, but the necessity of selecting perfect and healthy fruit, and the extreme care and cleanliness requisite in all steps of the manufacture, are here so little attended to, as, with very few exceptions, to render all these products quite unworthy of comparison with those previously described. They commonly contain unfermented sugar, or become *pricked* in consequence of the production of a little vinegar, and hence are extremely apt to disorder the stomach: instead of the tartar of the grape, they contain free citric and malic acids.

It may not be out of place here to remark, that the acidity of stomach and other symptoms of indigestion which follow occasional indulgence in wine, may, to a great extent, be prevented by a dose of magnesia at bed-time, which saturates the acid in the stomach, allays the febrile action, and passes off the next day by the bowels. Other absorbents, in conjunction with mild bitters, may be resorted to; and by such a plan the disturbance of the urinary secretion, and the dyspepsia which often lasts for some days, may be checked at its commencement.

In regard to *porter*, *ale*, and other varieties of *beer*, considering them as occasional remedies in the cure of disease, it may be remarked that they rarely agree with the stomach, except among the lower orders, who are in the habit of copious indulgence in those coarser products of fermentation. Hence it is that, under such circumstances, beer may be administered to convalescents with more advantage than wine; it is a less stimulating but more nutritive and soporific beverage; it induces more fulness of the system, and habitual excess in it generally fattens, creates a plethoric state of habit, and induces apoplexy or some of the minor symptoms of vascular turgidity.

ULMUS. *Cortex.* Elm Bark. The bark of *Ulmus campestris.* *Cl.* 5. *Ord.* 2. Pentandria Dygynia. *Nat. Ord.* Ulmaceæ.

This is a common indigenous tree; the bark is rough on the trunk, but smoother and fibrous on the branches; the leaves are rough, serrate, and dark-green; the flowers are clustered, numerous, and small, of a reddish-brown colour, and agreeable odour; the capsules are oblong.

Decoction of Elm-bark has been recommended in herpetic eruptions as an internal remedy, and is said to be demulcent and diuretic, but it appears to have little efficacy. Dr. A. T. Thomson recommends it as a substitute for sarsaparilla: the dose is from four to six ounces of the decoction twice or three times a day.

Decoctum Ulmi.	Decoction of Elm Bark.
℞ Ulmi recentis contusæ, uncias duas cum semisse,	Take of Fresh Elm Bark, bruised, two ounces and a half,
Aquæ destillatæ, octarios duos;	Distilled Water, two pints;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

According to Davy, elm-bark contains between two and three per cent. of tannin. Rinck obtained from 100 parts—

Resin	0·63
Gum and mucilage	20·30
Gallic acid and tan	6·50
Oxalate of lime	6·30 ?
Chloride of sodium (potassium?)	4·60
Lignin and loss	61·67
	100·

UNGUENTA. *Ointments.*

These are greasy applications, either soothing and astringent or absorbent, or stimulating and irritating: they are usually applied spread upon lint, and should therefore be of a fit consistence for that purpose; some of them, especially in cold weather, are too hard, and require the addition of oil. They are all liable to become rancid, and should therefore be kept in small quantities: as far as possible it is well to leave them to extemporaneous prescription.

The following is a list of these preparations contained in the *London Pharmacopœia.*

Unguentum Antimonii potassio-tartratis	Ointment of Potassio-tartrate of Antimony, *see* ANTIMONIUM.
Unguentum Cantharidis . .	Ointment of Cantharides, *see* CANTHARIDES.
Unguentum Cetacei . . .	Ointment of Spermaceti, *see* CETACEUM.
Unguentum Creasoti . . .	Ointment of Creasote, *see* CREASOTON.
Unguentum Elemi . . .	Ointment of Elemi, *see* ELEMI.
Unguentum Gallæ Compositum .	Ointment of Galls (compound), *see* GALLÆ.
Unguentum Hydrargyri Fortius .	Ointment of Mercury (stronger), *see* HYDRARGYRUM.
Unguentum Hydrargyri Mitius .	Ointment of Mercury (weaker), *see* HYDRARGYRUM.
Unguentum Hydrargyri Nitratis .	Ointment of Nitrate of Mercury, *see* HYDRARGYRUM.
Unguentum Hydrargyri Nitrico-Oxydi	Ointment of Nitric-Oxide of Mercury, *see* HYDRARGYRUM.
Unguentum Hydrargyri Iodidi .	Ointment of Iodide of Mercury, *see* HYDRARGYRUM.
Unguentum Hydrargyri Biniodi .	Ointment of Biniodide of Mercury, *see* HYDRARGYRUM.
Unguentum Hydrargyri Ammonio-Chloridi . . .	Ointment of Ammonio-Chloride of Mercury, *see* HYDRARGYRUM.
Unguentum Iodinii Compositum .	Ointment of Iodine (compound), *see* IODINIUM.
Unguentum Picis Liquidæ . .	Ointment of Pitch, *see* PIX LIQUIDA.
Unguentum Picis Nigræ . .	Ointment of Tar, *see* PIX NIGRA.
Unguentum Plumbi Compositum .	Ointment of Lead (compound), *see* PLUMBUM.
Unguentum Plumbi Iodidi . .	Ointment of Iodide of Lead, *see* PLUMBUM.
Unguentum Sambuci . . .	Ointment of Elder, *see* SAMBUCUS.
Unguentum Sulphuris . .	Ointment of Sulphur, *see* SULPHUR.
Unguentum Sulphuris Compositum	Ointment of Sulphur (compound), *see* SULPHUR.
Unguentum Veratri . . .	Ointment of White Hellebore, *see* VERATRUM.
Unguentum Zinci . . .	Ointment of Zinc, *see* ZINCUM.

UVA. *Baccæ exsiccatæ demptis acinis.* Raisins. The dried berries with the stones taken out, of the common vine: *Vitis vinifera. Cl.* 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Vitaceæ.

The vine is found wild in the South of Asia and in Greece. "It is a variable plant; the leaves more or less lobed; smooth, pubescent, or downy; flat or crisp; pale or deep-green; the branches prostrate, climbing or erect, tender or hard; the bunches loose or compact, ovate or cylindrical; the berries red, yellow, or purple, watery or fleshy, globose, ovate, or oblong; sweet, musky, or austere; seeded or seedless. (*De Candolle.*)

Grapes, when fully ripe and of good quality, are among the most refreshing and wholesome of fruits; they are gently laxative, and in large quantity somewhat diuretic. In Syria the inspissated juice of ripe grapes is used in febrile and inflammatory complaints. They have been recommended as an article of diet in phthisis. Raisins are more aperient than the fresh fruit, but are apt to create flatulency, and the husks and stones sometimes irritate the lower bowels. The juice of ripe white grapes contains sugar, mucilage, gluten, malic acid, and malate of lime, tartrate of lime, tartaric acid, and tartrate of potassa. The juice of unripe white grapes contains, according to Geiger, tartaric acid (about 1 per cent.), malic acid (about 2 per cent.), bitartrate of potassa, malate, sulphate, and phosphate of lime, a trace of chloride of calcium, tan, and gallic acid, saccharine and extractive matter, green resin, wax, and fibre. According to Scheele and Braconnot there is no other acid in the grape than the tartaric. The colour, and much of the astringency of the grape resides, with very few exceptions, entirely in the husks.

UVA URSI. *Folia.* Bearberry. Trailing Arbutus. Whortleberry? The leaves of *Arctostaphylos Uva Ursi.* *Cl.* 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Ericaceæ.

This plant grows in dry sandy woods, and on gravelly hills, in the North of Europe and America. Its stem is woody, trailing, and rooting, the young shoots only turning upwards. Bark deciduous and peeling off from the old stems. Leaves alternate, obovate, acute at base, attached by short petioles, coriaceous, evergreen, glabrous, shining above, paler beneath, entire, and in the young ones pubescent; the margin rounded, but scarcely reflexed. Flowers terminal, clustered. Pedicels reflexed, furnished at base with a short acute bract, and two minute ones on the sides. Sepals five, roundish, reddish and persistent. Corolla ovate or urceolate, white with a reddish tinge, transparent at base, contracted at the mouth, hairy inside, with five short reflexed segments. Stamens very slightly adhering to the base of the corolla; filaments hairy, anthers each with two horns and two pores. Ovary round; style straight, longer than the stamens; stigma simple. Disk a black indented ring. Fruit succulent, globular, depressed, deep-red, approaching to scarlet, with an insipid mealy pulp, and about five seeds, which cohere strongly together, so as to appear like the nucleus of a drupe. (*Lindley*).

The plant should be procured in autumn, and the green leaves alone selected and picked from the twigs, and dried by a moderate exposure to heat. The leaves are sometimes adulterated with those of *Vaccinium Vitis Idæa* (red whortleberry), which, however, are easily detected by wanting the reticulated surface of the *Uva Ursi* leaves, by their edges being revolute, sparsely and finely serrated, and dotted beneath, and by their infusion not yielding either tannin on the addition of a solution of isinglass, nor displaying the presence of gallic acid on the addition of sulphate of iron. (*Dr. A. T. Thomson.*)

The leaves of the uva ursi when chewed are astringent and bitterish sweet, and when carefully dried and powdered, smell like tea. They should be selected of a bright olive-green; when of a dingy brownish tint, they are often nearly tasteless: the powder should be of a pale olive colour. The dry leaves contain, according to Meissner,

Gallic acid	1·20
Tannin	36·40
Resin	4·40
Chlorophylle	6·35
Extractive, with malate and citrate of lime	4·17
Gum, and extractive soluble in potassa	33·30
Lignin	9·60
Water	4·58
	100·00

Uva ursi is administered in the form of powder, in the dose of from ten to thirty grains two or three times a day, or from half an ounce to two ounces of the *Decoction.*

Decoctum Uvæ Ursi.	Decoction of Uva Ursi.
℞ Uvæ Ursi contusæ, unciam,	Take of Uva Ursi (leaves), bruised, half an ounce,
Aquæ destillatæ, octarium cum semisse;	Distilled Water, a pint and a half;
Decoque ad octarium, et cola.	Boil down to a pint, and strain.

Very different opinions are entertained respecting the medicinal efficacy of uva ursi; by some it is considered as a mere astringent; by others as having a specific alterative and diuretic action, and as exerting a peculiar influence on the kidneys and the secretion of urine. It is used as a tonic, in ulceration of the urinary passages, and in nephriticand calculous cases: in dysuria, catarrhus vesicæ, gonorrhœa, and leucorrhœa. Mr. Pereira observes that its action is slow, and it therefore requires to be given for a considerable period; although the effects are uncertain, it sometimes gives astonishing relief. It may be detected in the urine within half an hour after taking it.

WEIGHTS and MEASURES, *see* Appendix.

YEAST, *see* Cerevisiæ Fermentum.

ZINCUM. *Zinc. Spelter.*

This metal is first mentioned by Albertus Magnus in 1280, but the ancients were acquainted with its ores, and with their property of converting copper into brass. The principal ores of zinc are the *sulphuret*, known to miners under the name of *blende*, and the *carbonate* and *silicate*, constituting the varieties of *calamine* (*see* Calamina). To obtain the metal, the ore is picked, broken, and roasted, to expel sulphur and carbonic acid; it is then washed, ground, mixed with about an eighth part of charcoal, and put into earthen pots placed in a circular furnace, each having an iron tube passing from its lower part through the floor of the furnace, and dipping into water; they are everywhere else closely luted; upon the application of a bright-red heat, the metal distils through the tube, and is collected in the water beneath; it is fused, and cast into cakes. A large proportion of the zinc used in England is imported through Hamburgh from Upper Silesia; there were formerly several zinc works near Bristol and Swansea; at present all except one have been abandoned, in consequence of the reduction of the duty upon the foreign article, and its superior quality. The duty upon cake and rolled zinc is 2*l.* per ton, and the average price is stated by Macculloch (*Dictionary*) to be 12*l.* per ton, exclusive of duty.

The zinc of commerce contains several impurities, the chief of which remain in the form of a black powder, when the metal is dissolved in dilute sulphuric acid.

Pure zinc is a blueish, brilliant metal, crystalline in its texture; its specific gravity is 6·8 to 7. It is tough at common temperature, brittle at a heat approaching to redness, but malleable and ductile between 212° and 300°; so that it may even be rolled out into very thin sheets and drawn into wire. Exposed to air its surface becomes coated by a thin film of oxide, which protects it from further action. It is highly combustible, and when melted, and afterwards heated in a crucible to bright redness, it burns with an intensely-bright flame, and emits abundance of white oxide; when in thin leaves, it may be set fire to in the flame of a candle, and if a coil of leaf-zinc be ignited and plunged into a jar of oxygen gas, its combustion is extremely rapid and brilliant.

Zinc is dissolved by the greater number of the acids, and when its oxide is thrown down from these solutions by the alkalis, in the form of hydrated oxide, it readily dissolves in caustic potassa and soda, and in pure and carbonated ammonia. This oxide, when dried, corresponds in composition with that obtained by combustion, and is the only salifiable oxide of zinc; it is a white tasteless powder, composed of—

	Atoms.	Equivalents.	Per Cent.
Zinc	1 . .	32 . .	80
Oxygen	1 . .	8 . .	20
Oxide of Zinc	1 . .	40 . .	100

The following is the formula of the Pharmacopœia for the preparation of this oxide.

ZINCI OXYDUM.	OXIDE OF ZINC.
℞ Zinci Sulphatis, libram,	Take of Sulphate of Zinc, a pound,
Ammoniæ Sesquicarbonatis, uncias sex cum semisse,	Sesquicarbonate of Ammonia, six ounces and a half,
Aquæ destillatæ, congios tres;	Distilled Water, three gallons;
Zinci sulphatem et ammoniæ sesquicarbonatem in aquæ destillatæ octariis duodecim separatim liqua, et cola; deindè misce. Quod demissum est affusâ sæpiùs aquâ lava et postremò igne acri per horas duas ure.	Dissolve the sulphate of zinc and the sesquicarbonate of ammonia separately in twelve pints of distilled water, and filter the solutions; then mix them. Wash the precipitate frequently with water, and lastly, burn it for two hours in a strong fire.

In this process sulphate of ammonia and carbonate and hydrate of zinc are formed, and some carbonic acid evolved; the former is soluble and washed away, the latter remains upon the strainer; its water and carbonic acid are expelled by the subsequent ignition.

This oxide, under the name of *flowers of zinc*, has long had a place in Pharmacopœiæ, and was prepared by exposing the metal to a temperature sufficient to cause its inflammation and rapid oxidizement. Old authors describe it under the name of *pompholix*, *nihil album*, and *philosopher's wool.* In Holland its preparation was kept secret, and it was sold under the name of *arcanum Ludemanni* or *luna fixata*, the composition of which was originally divulged by Gaubius. When procured by combustion it is apt to contain small particles of the unburnt metal; the above process is therefore preferable.

The therapeutic effects of oxide of zinc are stated to be tonic and antispasmodic, but, to say the least, it is very equivocal in its action. It has been prescribed with supposed advantage in some obstinate and painful dyspeptic and neuralgic affections; in hysteria and epilepsy; and in whooping-cough. The dose for an adult is from two to eight or ten grains two or three times a day, and in stomach cases it may be conjoined with bitters. In large doses it nauseates and purges. By long-continued use, it acts as a slow poison, and produces *tabes sicca.* A gentleman, for the cure of epilepsy, took daily at an average, twenty grains of oxide till he consumed 3246 grains, which must have taken him about five months. At the end of this time he was found of a pale earthy hue; his tongue was thickly coated, the bowels were constipated, the inferior extremities cold and œdematous, the abdomen tumid, the superior extremities cold and shrivelled, and their skin dry like parchment; the pulse was about sixty, thready and scarcely perceptible. Under the use of purgatives, a light nutritive diet, with tonic and diuretic medicines he rapidly recovered, but he remained subject to the epileptic attacks. (*Brit.* and *For. Med. Rev.*, July 1838.)

UNGUENTUM ZINCI.	OINTMENT OF ZINC.
℞ Zinci Oxydi unciam,	Take of Oxide of Zinc, an ounce,
Adipis uncias sex;	Lard, six ounces;
Misce.	Mix.

This ointment is useful in the same cases as the *Ceratum Calaminæ* (p. 130), it represses profuse discharges, and soothes irritable sores and surfaces.

ZINCI SULPHAS.	SULPHATE OF ZINC.
℞ Zinci frustulorum uncias quinque,	Take of Zinc in small pieces, five ounces,
Acidi Sulphurici diluti octarios duos;	Diluted Sulphuric acid, two pints;
Zinci frustulis Acidum Sulphuricum dilutum paulatim superinfunde, et finitâ effervescentiâ liquorem cola, tum decoque donec pellicula subnascatur. Denique sepone, ut fiant crystalli.	Pour the diluted sulphuric acid gradually upon the pieces of zinc, and the effervescence being finished, filter the solution, then boil it down till a pellicle begins to form. Lastly, set it aside that crystals may be formed.

NOTA.	NOTE.
ZINCI SULPHAS (*crystalli*). In aqua tota liquatur. Quod ab ammoniâ demittitur albet, idemque hâc suprà modum additâ rursus dissolvitur. Adjecto aut barii chlorido, aut plumbi acetate permutatur.	SULPHATE OF ZINC (*crystals*). Totally dissolved by water. What is thrown by ammonia is white, and when the ammonia is added in excess it is again dissolved. On the addition of chloride of barium or acetate of lead, it is decomposed.

In the above process the zinc is oxidized at the expense of the oxygen of the water, the hydrogen of which is evolved, and the resulting oxide of zinc unites to the acid to form the *sulphate of zinc* which crystallises in right rhombic prisms. The crystals are slightly efflorescent, soluble in 2·5 parts of water at 60°, fusible, and at a high red-heat, decomposed, leaving oxide of zinc. A very impure form of this salt is prepared from the native sulphuret, and is known in commerce under the name of white vitriol; it should by no means be substituted for the pure sulphate, the crystals of which consist of

	Atoms.	Equivalents.	Per Cent.
Oxide of Zinc	1	40	28
Sulphuric Acid	1	40	28
Water	7	63	44
Crystallised Sulphate of Zinc	1	143	100

As an internal remedy, sulphate of zinc is chiefly used as a tonic and emetic; a quarter of a grain, for instance, twice or thrice a day, in dyspepsia; in epilepsy one or two grains have been given every four or six hours; and in all diseases of debility connected with inflammatory action, it has been preferred to other mineral tonics, as being less apt to excite thirst, arterial action, and other febrile symptoms; but it is doubtful whether there are good grounds for this preference.

In dyspeptic affections, sulphate of zinc and other similar remedies generally require to be given in very small doses, and to be long persevered in, if we wish to derive the utmost benefit from their powers. Dr W. Philip says of this remedy—"in the opinion of many, the sulphate of zinc, given in very small doses, holds a distinguished place among the astringents suited to indigestion, and it is sometimes successful where other tonics fail. It may be given at later periods than iron, but it requires caution, and if its good effects do not soon appear, should be laid aside. It is one of those powerful agents which must always be employed with some degree of suspicion."

Sulphate of zinc is one of the numerous remedies resorted to in the treatment of epilepsy, where it is usually given with vegetable bitters, and with the more powerful antispasmodics, as in the following formulæ:—

℞ Zinci Sulphatis gr. x.
Extract lupuli, ʒj.
Misce optimè et divide in pilulas XXIV sumantur duæ bis vel ter die.

The following has also been much extolled in epilepsy, by those who confide in the virtues of musk:—

℞ Zinci Sulphatis, gr. x.
Moschi, ʒj.
Camphoræ, ℈j.
M. et divide in pilulas viginti, quarum sumantur duæ bis vel ter in die.

In diseases attended by considerable irritability as well as debility, sulphate of zinc certainly appears preferable to sulphate of iron. In the advanced period of whooping-cough, from an eighth to a quarter of a grain may be given twice or three times a day, conjoined with small doses of infusion of bark, or of cascarilla; or it may, if requisite, be united in pills with extract of hemlock or of henbane. In spasmodic coughs, it is administered, according to Dr. Paris, with the best effects, especially when combined with camphor or myrrh.

℞ "Zinci Sulphatis, gr. x.
Myrrhæ in pulverem tritæ, ʒjss.
Confect. Rosæ q. s. ut fiant pilulæ viginti, è quibus sumantur binæ bis quotidie."

He also recommends it, in the form of lozenge, in affections of the chest attended with inordinate secretion.

In the cure of intermittent fevers, sulphate of zinc is a valuable tonic, either with or without Peruvian bark; and in obstinate cases, where the use of arsenic has been suggested, this salt should have a previous trial.

℞ Zinci Sulphatis, gr. ij.
Aquæ Cinnamoni,
—— destillatæ, āā fʒijss.
Tincturæ Calumbæ, fʒj.
M. fiat mistura cujus capiat æger cochlearia tria ampla tertiâ vel quartâ quâque horâ.

It has been said that sulphate of zinc, which occasions a precipitation in infusion of Peruvian bark, is therefore incompatible with it; but the combination remains very effective. It may be prescribed in either of the following forms:—

℞ Zinci Sulphatis gr. ss.
Decocti Cinchonæ fʒxv.
Tincturæ Gentianæ compos. ʒj.
M. fiat haustus ter quaterve die sumendus.

℞ Zinci Sulphatis gr. ¼.
Quiniæ Sulphatis gr. ij.
Infusi Rosæ compos. fʒx.
Tincturæ Aurantii,
Syrupi Aurantii, āā fʒj.
M. fiat haustus quartâ quâque horâ sumendus.

As an emetic, sulphate of zinc is generally rapid and certain in its action, and well suited to cases in which it is desired to empty the stomach of any poisonous contents. The average dose for this purpose is twenty grains.

℞ Zinci Sulphatis, ℈j.
Aq. Menthæ viridis, fʒjss.
Spt. Lavandulæ compos. fʒj.
Fiat haustus emeticus.

But at the commencement of febrile diseases, and in analogous cases where emetics are administered, tartarised antimony and ipecacuanha, which tend to produce diaphoresis, independent of the mere exertion of vomiting, are to be selected in preference to it.

In ulcerated sore throat a gargle of sulphate of zinc is often of great local service: the following is among other forms that may be used:—

℞ Zinci Sulphatis, ℈j.
Aquæ Rosæ f℥vij.
Oxymellis Simpl. f℥j.
M. fiat gargarisma frequenter utendum.

In the form of a dilute solution in distilled water, sulphate of zinc is a good astringent: as such it is used in ophthalmia, after the vascular congestion and excessive irritability have been removed, and when the inflammation tends to become chronic.

℞ Zinci Sulphatis, gr. x.
Aquæ Rosæ, f℥viij.
M. fiat collyrium.

A similar or somewhat stronger solution may also be employed with advantage in the latter stages of gonorrhœa.

There are a few other preparations of zinc which have been used as remedial agents, and which have places in other Pharmacopœiæ.

Chloride of Zinc, (*Muriate of Zinc. Butter of Zinc,*) obtained by evaporating a solution of zinc in hydrochloric acid to dryness and fusing it, has been employed in very small doses as an alterative, and externally as a caustic. It is given in solution, in the dose of half a grain gradually increased. Hufeland recommends the *Æther Zinci*, made by digesting two ounces of fused chloride of zinc in a mixture of two ounces of æther with one ounce of alcohol, and after some days decanting the clear solution; the dose is from four to eight drops twice a day. But except in a few particular cases ethereal solutions are objectionable, and are liable to vary in strength from the facility with which the solvent evaporates. Scrofula, chorea, epilepsy, and neuralgia, are the diseases in which this remedy has principally been prescribed, but not with such success as to give it any peculiar claims to notice. Externally, a dilute solution, composed of about two grains of the chloride to an ounce of water, has been used as a lotion in scrofulous and fistulous sores. It has been applied as a caustic to destroy *nævi materni*, and to parts affected with cancer, *fungus hæmatodes*, and ill-conditioned ulcers. "The benefit is supposed to depend, not merely on the escharotic effect, but on the chloride inducing a new action in the surrounding parts." "Its *local action* upon living tissues is that of a caustic, depending partly on its affinity for albumen and gelatine; so that when placed in contact with living parts into whose composition these organic compounds enter, the chloride exercising its affinity, first destroys the life of the part, and then unites with the albuminous and gelatinous matter present, and thus forms an eschar. Other chemical changes of a comparatively unimportant nature are also effected; thus various salts found in the solids or liquids of the part may be decomposed. For example, when the chloride is applied to a cancerous sore, it decomposes the carbonate and hydrosulphate of ammonia found in the secretion of the sore. The effects produced by the application of chloride of zinc are the following: soon after it has been applied, a sensation of warm this felt in the part, quickly followed by violent burning pain, which continues for seven or eight hours; that is, until the parts in contact with the chloride are dead. A white eschar is now observed, which actually separates in from eight to twelve days. Unless used in the neighbourhood of loose cellular tissue, there is rarely much swelling." (*Pereira.*) A valuable practical paper on the uses and effects of this chloride in the treatment of cancerous sores has been contributed to the *Medical Gazette* (vol. XVII.) by Dr. Alexander Ure.

ACETATE OF ZINC is another preparation of the metal, which has a place in the *Edinburgh* and *Dublin Pharmacopœiæ.* It may be prepared by double decomposition, when equivalents of acetate of lead and sulphate of zinc are mixed together in solution. It crystallises in rhomboidal plates; is very soluble, and slightly efflorescent. It is tonic and astringent, perhaps antispasmodic; in large doses it is emetic; but it is chiefly confined to external use. The Dublin college directs it in alcoholic solution (*Tinctura Acetatis Zinci*), of which one drachm contains about four grains of the crystallised salt.

What is known of the *toxicological effects* of the salts of zinc, will be found in Orfila and Christison, especially in reference to the poisonous powers of the *sulphate.* When administered to dogs, it excites vomiting, and no further bad effects ensue; but if the gullet be tied, a sufficient dose produces death in three days, the intermediate phænomena being chiefly those of local irritation, and the appearances in the dead body those of incipient inflammation of the stomach. Injected into the veins, forty-eight grains produced almost instant death, and half that quantity proved fatal in three minutes. The outlines of several cases in which large doses of sulphate of zinc have proved fatal to man, are given by Dr. Christison, and in which its external application is presumed to have been deleterious.

From the increasing use of zinc in the construction of water cisterns and culinary vessels, its effect upon the system in continuous but small quantities has become of additional interest; and it certainly does not appear that, under such circumstances, any alarming effects are to be apprehended. In regard to the *sulphate*, Dr. Christison says, "I have often given, medicinally, from three to six grains, thrice every twenty-four hours, for eight, twelve, or fourteen days, without observing any particular effect, except in some persons sickness, when the largest doses were taken." The following is the process recommended by this author for the detection of sulphate of zinc when mixed with animal or vegetable substances. The mixture being strained through gauze, is to be acidulated with acetic acid, and filtered through paper. The acetic acid dissolves any oxide of zinc that may have been thrown down in union with animal matter. The filtered fluid is then to be evaporated to a convenient extent, and treated, when cool, with sulphuretted hydrogen gas, upon which a grayish or white milkiness, or precipitate, will be formed. The excess of gas must now be expelled by boiling, and the precipitate washed by the process of subsidence and affusion, and collected on a filter. It is then to be dried, and heated to redness in a tube. When it has cooled, it is to be acted on by strong (dilute?) nitric acid, which dissolves the zinc and leaves the sulphur. The nitrous solution should next be diluted, and neutralised with carbonate of ammonia, after which the usual tests will act characteristically. These tests are, the alkaline carbonates, ferrocyanuret of potassium, and sulphuretted hydrogen, all of which give white precipitates. Of the alkaline carbonates, carbonate of ammonia is the most delicate test, and the precipitate is redissolved by excess of that carbonate, and is not again thrown down by boiling.

ZINGIBER. *Rhizoma.* Ginger. The Rhizoma of *Zingiber officinalis.* *Cl.* 1. *Ord.* 1. Monandria Monogynia. *Nat. Ord.* Zingiberaceæ.

The ginger-plant is said to be a native of the East Indies, and to derive its name from, and abound in, the mountainous district of *Gingi*, to the east of Pondicherry. It is cultivated all over the tropics of Asia and America.

The rhizoma is tuberous and biennial. Stems erect, and oblique, invested by the smooth sheaths of the leaves; generally three and four feet high, and annual. Leaves sub-sessile on their long sheaths, bifarious, linear-lanceolate, very smooth above, and nearly so underneath; sheaths smooth, crowned with a bifid ligula. Scapes radical, solitary, a little removed from the stems, from six to twelve inches high, enveloped in a few obtuse sheaths, the uppermost of which sometimes end in tolerably long leaves. Spikes oblong, the size of a man's thumb. Exterior bracts imbricated, one-flowered, obovate, smooth, membranous at the edge, faintly striated lengthwise; interior enveloping the ovary, calyx, and the greater part of the tube of the corolla. Flowers rather small when compared with the rest of this natural order. Calyx tubular, opening on one side, three-toothed. Corolla with a double limb; outer of three, nearly equal, oblong segments; inner a three-lobed lip, of a dark purple colour. Sterile stamens subulate. Filaments short. Anther oblong, double, crowned with a long, curved, tapering, grooved horn. Ovary oval, three-celled, with many ovules in each; style filiform; stigma funnel-shaped, ciliate, lodged just under the apex of the horn of the anther. (*Lindley*).

The herbaceous part of the plant withers in December; the rhizomes are dug up in January; but when it is intended to be preserved in syrup, it is dug up when the shoots do not exceed five to six inches in height. For preparing the dried ginger, the best pieces are selected, scraped, then washed, and dried in the sun with great care. This is called *white ginger;* in contradistinction to which, the rhizomes which are scalded in boiling water before being dried, are denominated *black ginger.*

The confected, or preserved ginger, is prepared by scalding the green rhizomes till they are tender, then peeling them in cold water, and putting them into a thin syrup, from which, in a few days, they are shifted into the jars in which they come home, and a very rich syrup poured over them, which is sometimes three or four times renewed. In Jamaica, the shifted syrup is diluted with water and fermented into a pleasant liquor. (*Lond. Disp.*)

The finest ginger, usually called *Jamaica ginger*, comes into the market in two states, *white* and *brown*. They both are the scraped rhizomes, prepared as above described; but the *white* is usually washed in whiting and water, or *whitewashed* (as is said, to preserve it from insects), and often has been bleached with chloride of lime; while the latter is of its natural colour, which is grayish buff. The large fleshy and plump pieces are to be preferred; they should not be too damp or moist, or worm-eaten, nor should they have a disagreeable sourish odour. Fine ginger is nearly inodorous when whole; it has a fibrous fracture; and, when cut, is soft, somewhat mealy, and of a very pale buff tint; the appearance of the section is the best criterion for judging of its goodness; the second-rate ginger cuts woody, hard, and knotty. The size of the pieces is not of so much importance, for the small ginger is often of excellent quality, and though less prized than the larger, is quite as well-flavoured, and makes as good a powder. The powder should be of a brightish straw-colour, a little inclining to buff; its odour peculiar. The taste of ginger is biting, and it has an agreeable aromatic pungency. It should be free from mustiness. As it is usually sold it is apt to be damp, and to become mouldy when kept in the cask; it should be exposed to the air, and preserved in a dry place. The dark or black ginger is less agreeable and aromatic than the white; it is of a dingy gray internally, and hard and woody.

Ginger imparts its flavour to water, alcohol, and ether; hot water extracts from it a considerable proportion of matter resembling starch. Alcohol and ether take up little else than its volatile oil and resin, in which its flavour and acrimony reside. The alcoholic tincture has the pungency and flavour of ginger in perfection.

Ginger has been analysed by Bucholz, and by M. Morin, of Rouen: according to the former, its proximate components are,

Volatile oil	1·55
Aromatic resin	3·60
Bitter extractive, soluble in pure alcohol	0·65
Acrid extractive, insoluble in pure alcohol	10·50
Gum	12·05
Glutinous extractive, separated by caustic alkali	26·00
Bassorin and starch	28·05
Lignin	8·00
Water	9·60
	100

Morin obtained two kinds of resin, a blueish-green volatile oil, free acetic acid, acetate of potassa, osmazome, gum, vegeto-animal-matter, sulphur, starch, and lignin.

The officinal formulæ of ginger are the following, besides which it enters into the composition of many of the other preparations of the Pharmacopœia:

Syrupus Zingiberis.	Syrup of Ginger.
℞ Zingiberis concisæ, uncias duas cum semisse,	Take of Ginger, sliced, two ounces and a-half,
Aquæ ferventis, octarium,	Boiling Water, a pint,
Sacchari, libras duas cum semisse;	Sugar, two pounds and a-half;
Macera zingiberem in aquâ per horas quatuor, et cola; dein saccharum adjice, et liqua.	Macerate the ginger in the water for four hours, and strain; then add the sugar, and dissolve it.

Tinctura Zingiberis.	Tincture of Ginger.
℞ Zingiberis concisæ, uncias duas cum semisse,	Take of Ginger, sliced, two ounces and a-half,
Spiritûs rectificati, octarios duos;	Rectified Spirit, two pints;
Macera per dies quatuordecim, et cola.	Macerate for fourteen days, and filter.

In the form of powder, ginger is an excellent carminative stimulant, assisting and promoting feeble digestion, and of service in the flatulency and dyspepsia of gouty and rheumatic habits; it is a valuable adjunct to several other remedies, and especially effective in diminishing the griping tendency of senna, jalap, and similar purges. Combined with rhubarb, it forms a good stomachic pill, especially where flatulency and rumbling come on before or after meals. Three grains of rhubarb, four of ginger, and a drop of oil of cloves, may be formed into two pills, to be taken before dinner, or when required. When ginger is chewed, it operates as a sialagogue, relieving toothach. Ginger lozenges, and ginger pearls, are convenient and portable forms of ginger; it is also sometimes formed into tablets, which are useful in the relief of hoarseness arising from relaxed uvula and sluggish excretion of mucus. Candied and preserved ginger are chiefly used as sweetmeats; the *syrup* of the Pharmacopœia is scarcely strong enough to be of any use in the small quantity in which it is generally employed, and the *tincture* is much improved by doubling the quantity of ginger; it then constitutes what has been termed *essence of ginger*, and is an elegant and active adjunct to many formulæ. The tincture made, as formerly, with proof spirit, was never clear, in consequence of the presence of a portion of gum. Rectified spirit dissolves the oil and resins only, in which the pungency and virtues of ginger exclusively reside. A multitude of nervous and dyspeptic symptoms are occasionally relieved by taking *ginger tea*, morning and evening. Another form of ginger, grateful both to the palate and stomach, when it is carefully and cleanly prepared, is *ginger beer*.

APPENDIX.

APPENDIX.

TABLE I.

EQUIVALENTS AND SYMBOLS OF THE SIMPLE SUBSTANCES.

	Equivalents, Hydrogen = 1.	Symbol. (Brande.)	Symbol. (Berzelius.)	Equivalents, Oxygen = 1.
1 Aluminum	10	*al.*	Al.	1·25
2 Antimony	65	*ant.*	Sb.	8·125
3 Arsenic	38	*ar.*	As.	4·75
4 Barium	69	*ba.*	Ba.	8·625
5 Bismuth	72	*bi.*	Bi.	9·
6 Boron	20	*bo.*	B.	2·5
7 Bromine	78	*b.*	Br.	9·75
8 Cadmium	56	*cad.*	Cd.	7·
9 Calcium	20	*cal.*	Ca.	2·5
10 Carbon	6	*car.*	C.	0·75
11 Cerium	48	*ce.*	Ce.	6·
12 Chlorine	36	*c.*	Cl.	4·5
13 Chromium	28	*chr.*	Cr.	3·5
14 Cobalt	30	*cob.*	Co.	3·75
15 Columbium	185	*col.*	Ta.	23·125
16 Copper	32	*cu.*	Cu.	4·
17 Fluorine	18	*f.*	F.	2·25
18 Glucium	18	*gl.*	G.	2·25
19 Gold	200	*au.*	Au.	25·
20 Hydrogen	1	*h.*	H.	0·125
21 Iodine	125	*i.*	I.	15·625
22 Iridium	96	*ir.*	Ir.	12·
23 Iron	28	*fe.*	Fe.	3·5

	Equivalents, Hydrogen = 1.	Symbol (Brande.)	Symbol (Berzelius.)	Equivalents, Oxygen = 1.
24 Lead	104	*pl.*	Pb.	13·
25 Lithium	10	*li.*	L.	1·25
26 Magnesium	12	*mag.*	Mg.	1·5
27 Manganese	28	*man.*	Mn.	3·5
28 Mercury	200	*hg.*	Hg.	25·
29 Molybdenum	48	*mol.*	Mo.	6·
30 Nickel	28	*nic.*	Ni.	3·5
31 Nitrogen	14	*n.*	N.	1·75
32 Osmium	100	*os.*	Os.	12·5
33 Oxygen	8	*o.*	O.	1·
34 Palladium	54	*pal.*	Pd.	6·75
35 Phosphorus	16	*p.*	P.	2.
36 Platinum	96	*pla.*	Pl.	12·
37 Potassium	40	*po.*	K.	5·
38 Rhodium	45	*rh.*	R.	5·625
39 Selenium	40	*se.*	Se.	5·
40 Silicium	8	*si.*	Si.	1·
41 Silver	110	*ag.*	Aq.	13·75
42 Sodium	24	*so.*	Na.	3·
43 Strontium	44	*str.*	Sr.	5·5
44 Sulphur	16	*s.*	S.	2·
45 Tellurium	32	*tel.*	Te.	4·
46 Thorium	60	*th.*	Th.	7·5
47 Tin	58	*sta.*	Sn.	7·25
48 Titanium	24	*ti.*	Ti.	3·
49 Tungsten	100	*tu.*	W.	12·5
50 Vanadium	68	*va.*	V.	8·5
51 Uranium	217	*ur.*	U.	27·12
52 Yttrium	32	*yt.*	Y.	4·
53 Zinc	32	*zn.*	Zn.	4·
54 Zirconium	30	*zir.*	Zr.	3·75

In the preceding table the second column shows the equivalents of the simple or elementary substances in reference to hydrogen, as = 1. These numbers involve the hypothesis that all atomic weights may be represented by entire numbers: the accuracy of such an hypothesis has been ably maintained by Dr. Prout, Mr. Phillips, and other eminent and accurate analysts, and under such circumstances deserves to be accepted from its simplicity and convenience: such numbers are, at all events, as close approximations to the truth as we can at present expect to attain, and are so much more easily acquired and retained than the series deduced from the oxygen unit, as to merit the preference as far as students are concerned. The fifth column of the table shows the equivalents in reference to oxygen as = 1. It is, however, obvious, that the numbers upon the hydrogen and oxygen scale are mutually convertible into each other, by dividing the former, or multiplying the latter by 8. The French and German chemists generally express oxygen by = 100; hydrogen therefore becomes 12·5, sulphur 200, carbon 75, &c. But they unfortunately reject the simple relation of oxygen to hydrogen which those numbers bear, and which in this case is consistent with the most rigid accuracy, and instead of giving the atom of oxygen as = 100, and that of hydrogen as = 12·5, they (many of them at least) represent oxygen as = 100, and hydrogen as =12·48, sulphur as = 201·16, carbon as = 75·33, &c.: and to add to the complexity, they choose to represent water, not as a compound of 1 atom of oxygen and 1 atom of hydrogen, (a view which all analogy not only sanctions but enforces,) but as a compound of 1 atom of oxygen and 2 atoms of hydrogen, in order apparently to make the theory of atomic *weights* chime in with the theory of *volumes;* so that as far as the general reader is concerned, he is apt to become extremely perplexed by these dissonances. Dumas for instance, (and I cannot quote a more useful or elaborate writer,) thus represents the composition of water.

Oxygen . .	88·90	or	100 . .	1 atom oxygen,
Hydrogen .	11·10		12·48 . .	2 atoms hydrogen,
	100		112·48	1 atom of water.

Here, therefore, the atom of hydrogen is represented by 6·24; but oxygen by 100. Now if we once deviate from that axiom of the atomic theory which regards water as a compound of *one* atom of oxygen + *one* atom of hydrogen, we get into endless perplexities; and are obliged, in order to assimilate many of the equivalents adopted by Dumas to those generally employed here, either to double the equivalent of oxygen, or to halve those of the other elements. He represents alcohol, for instance, as a compound of

8 atoms of carbon
12 ——— hydrogen,
2 ——— oxygen.

Now this statement is quite at variance with the usually accepted view, which regards alcohol as composed of

4 atoms of carbon,
6 ——— hydrogen,
2 ——— oxygen,

or what amounts to the same thing,

2 atoms of carbon,
3 ——— hydrogen,
1 ——— oxygen.

Again, in stating the atomic constitution of hydrochloric acid, 1 atom of chlorine and 1 atom of hydrogen, are represented by Dumas as constituting *two* atoms (instead of *one*) of that acid.

The third and fourth columns of the preceding table contain the *symbols* which represent single atoms of the simple substances; in the third column are those which I have adopted, and in the fourth, those used by Berzelius; it will be observed that they are thus far very similar; but in applying them to the representation of compounds, and in abbreviating the latter, I have rather followed the suggestions of Professor Whewell, than the system of the Continental chemists. In my *Manual of Chemistry*, I have given the reasons for this preference, and abundant instances of their applications, I shall therefore in this place, merely add a few illustrative cases.

	Symbols.	Abbreviated.	Symbols.	Abbreviated
Water	$(h + o)$	q	HO	$\dot{H}$
Sulphuric Acid	$(s + 3o)$	s'	SO_3	$\dddot{S}$
Nitric Acid	$(n + 5o)$	n'	NO_5	$\overset{\cdot\cdot\cdot\cdot\cdot}{N}$
Hydrochloric Acid	$(h + c)$	hc'	$H + C$	HC
Hydrocyanic Acid	$(2car + n + h)$	hcy'	C_2NH	HCy
Potassa	$(po + o)$	P	KO	$\dot{K}$
Sulphate of Potassa	$(po + o) + (s + 3o)$	$P + s'$	$KO + SO_3$	$K\dddot{S}$
Nitrate of Lime	$(cal + o) + (n + 5o)$	$C + n'$	$CaO + NO_5$	$\dot{Ca}\ \overset{\cdot\cdot\cdot\cdot\cdot}{N}$
Hydrochlorate of Ammonia	$(n + h) + (3h + c)$	$A + hc'$	$NH^3 + HCl$	$NH^3 + HCl$

TABLE II.

ATOMIC CONSTITUTION AND EQUIVALENTS OF COMPOUNDS.

	Atoms.		Equivalents.	
Acid, Acetic	4 Carbon	(6 × 4) =	24	51
	3 Oxygen	(8 × 3) =	24	
	3 Hydrogen	=	3	
—— —— (crystallised)	1 Dry Acid	=	51	60
	1 Water	=	9	
—— Arsenious	1 Arsenic	=	38	50
	1½ Oxygen	(8 × 1·5) =	12	
—— Benzoic	14 Carbon	(6 × 14) =	84	113
	5 Hydrogen	=	5	
	3 Oxygen	(8 × 3) =	24	
—— Boracic	1 Boron	=	20	68
	6 Oxygen	(8 × 6) =	48	
—— Carbonic	1 Carbon	=	6	22
	2 Oxygen	(8 × 2) =	16	
—— Citric	4 Carbon	(6 × 4) =	24	58
	4 Oxygen	(8 × 4) =	32	
	2 Hydrogen	=	2	
—— Hydriodic	1 Iodine	=	125	126
	1 Hydrogen	=	1	
—— Hydrochloric	1 Chlorine	=	36	37
	1 Hydrogen	=	1	
—— Hydrocyanic	1 Cyanogen	=	26	27
	1 Hydrogen	=	1	
—— Hydrosulphuric	1 Sulphur	=	16	17
	1 Hydrogen	=	1	
—— Nitric	1 Nitrogen	=	14	54
	5 Oxygen	(8 × 5) =	40	
—— —— (liquid, sp. gr. 1·5)	1 Dry Acid	=	54	67
	1½ Water	(9 × 1·5) =	13	
—— Oxalic	2 Carbon	(6 × 2) =	12	36
	3 Oxygen	(8 × 3) =	24	
—— —— (cryst^{d}.)	1 Dry Acid	=	36	63
	3 Water	(9 × 3) =	27	

	Atoms.		Equivalents.	
Acid, Phosphoric	1 Phosphorus	=	16	36
	2½ Oxygen	(8 × 2·5) =	20	
— Succinic	4 Carbon	(6 × 4) =	24	50
	3 Oxygen	(8 × 3) =	24	
	2 Hydrogen	=	2	
— Sulphuric	1 Sulphur	=	16	40
	3 Oxygen	(8 × 3) =	24	
— — liquid, sp. gr. 1·48	1 Dry Acid	=	40	49
	1 Water	=	9	
— Tartaric	4 Carbon	(6 × 4) =	24	66
	5 Oxygen	(8 × 5) =	40	
	2 Hydrogen	=	2	
— — (cryst^{d}.)	1 Dry Acid	=	66	75
	1 Water	=	9	
Alcohol	2 Carbon	(6 × 2) =	12	23
	3 Hydrogen	=	3	
	1 Oxygen	=	8	
Alum	3 Sulphate of Alumina	(58 × 3) =	174	262
	1 Sulphate of Potassa	=	88	
— (cryst^{d}.)	1 Dry Alum	=	262	487
	25 Water	(9 × 25) =	225	
Alumina	1 Aluminum	=	10	18
	1 Oxygen	=	8	
— Sulphate	1 Alumina	=	18	58
	1 Sulphuric Acid	=	40	
Ammonia	1 Nitrogen	=	14	17
	3 Hydrogen	=	3	
— Acetate	1 Ammonia	=	17	68
	1 Acetic Acid	=	51	
— Citrate	1 Ammonia	=	17	75
	1 Citric Acid	=	58	
— Hydrated Sesquicarbonate	1 Ammonia	=	17	59
	1½ Carbonic Acid	(22 × 1·5) =	33	
	1 Water	=	9	
— Hydrochlorate	1 Ammonia	=	17	54
	1 Hydrochloric Acid	=	37	
— Sulphate (cryst^{d}.)	1 Ammonia	=	17	66
	1 Sulphuric Acid	=	40	
	1 Water	=	9	
Antimony				

	Atoms.		Equivalents.	
Antimony, Chloride	1 Antimony		65	119
	1½ Chlorine	(36 × 1·5)	54	
—— Sesquioxide	1 Antimony		65	77
	1½ Oxygen	(8 × 1·5)	12	
—— Antimonious acid	1 Antimony		65	81
	2 Oxygen	(8 × 2)	16	
—— Antimonic acid	1 Antimony		65	85
	2½ Oxygen	(8 × 2·5)	20	
—— Sesquisulphuret	1 Antimony		65	89
	1½ Sulphur	(16 × 1·5)	24	
—— Potassio-Tartrate (cryst^{d}.)	2 Protoxide of Antimony	(77 × 2)	154	361
	1 Bitartrate of Potassa		180	
	3 Water	(9 × 3)	27	
Arsenic				38
Arsenious Acid	1 Arsenic		38	50
	1½ Oxygen	(8 × 1·5)	12	
Arsenic Acid	1 Arsenic		38	58
	2½ Oxygen	(8 × 2·5)	20	
Barium				69
—— Chloride	1 Barium		69	105
	1 Chlorine		36	
—— —— (cryst^{d}.)	1 Chloride of Barium		105	123
	2 Water	(9 × 2)	18	
Baryta	1 Barium		69	77
	1 Oxygen		8	
—— Carbonate	1 Baryta		77	99
	1 Carbonic Acid		22	
—— Sulphate	1 Baryta		77	117
	1 Sulphuric Acid		40	
Bismuth				72
—— Oxide	1 Bismuth		72	80
	1 Oxygen		8	
—— Trisnitrate	3 Oxide of Bismuth	(80 × 3)	240	294
	1 Nitric Acid		54	
Boron				20
Bromine				78
Calcium				20
—— Chloride	1 Calcium		20	56
	1 Chlorine		36	

	Atoms.		Equivalents.	
Calcium, Oxide (*see* LIME)	1 Calcium	=	20	28
	1 Oxygen	=	8	
Carbon				6
Chlorine				36
Cinchonia				153
Copper				32
—— Diacetate	2 Oxide of Copper	(40 × 2) =	80	131
	1 Acetic Acid	=	51	
—— —— (cryst^{d}.)	1 Diacetate	=	131	185
	6 Water	(9 × 6) =	54	
—— Acetate	1 Oxide of Copper	=	40	91
	1 Acetic Acid	=	51	
—— —— (cryst^{d}.)	1 Acetate	=	91	100
	1 Water	=	9	
—— Oxide	1 Copper	=	32	40
	1 Oxygen	=	8	
—— Sulphate	1 Oxide of Copper	=	40	80
	1 Sulphuric Acid	=	40	
—— —— (cryst^{d}.)	1 Sulphate of Copper	=	80	125
	5 Water	(9 × 5) =	45	
Cyanogen	2 Carbon	(6 × 2) =	12	26
	1 Nitrogen	=	14	
Ether	4 Carbon	(6 × 4) =	24	37
	5 Hydrogen	=	5	
	1 Oxygen	=	8	
Gum	13 Carbon	(6 × 13) =	78	186
	12 Hydrogen	=	12	
	12 Oxygen	(8 × 12) =	96	
Hydrogen				1
Iodine				125
Iron				28
—— Iodide	1 Iron	=	28	153
	1 Iodine	=	125	
—— Potassio-Tartrate	1 Tartrate of Potassa	=	114	220
	1 Sesquitartrate of Iron	=	106	
—— Percyanide	4 Sesquicyanide of Iron	(67 × 4) =	268	430
	3 Cyanide of Iron	(54 × 3) =	162	
—— Protoxide	1 Iron	=	28	36
	1 Oxygen	=	8	

	Atoms.		Equivalents.	
Iron Sesquioxide	1 Iron		= 28	40
	1½ Oxygen		= 12	
— Sesquichloride	1 Iron		= 28	82
	1½ Chlorine		= 54	
— Sulphate	1 Protoxide of Iron		= 36	76
	1 Sulphuric Acid		= 40	
— — (cryst^{d}.)	1 Dry Sulphate		= 76	139
	7 Water	(9 × 7)	= 63	
Lead				104
— Acetate	1 Protoxide of Lead		= 112	163
	1 Acetic Acid		= 51	
— — (cryst^{d}.)	1 Dry Acetate		= 163	190
	3 Water	(9 × 3)	= 27	
— Diacetate	2 Protoxide of Lead	(112 × 2)	= 224	275
	1 Acetic Acid		= 51	
— Protoxide	1 Lead		= 104	112
	1 Oxygen		= 8	
— Carbonate	1 Protoxide of Lead		= 112	134
	1 Carbonic Acid		= 22	
— Chloride	1 Lead		= 104	140
	1 Chlorine		= 36	
— Iodide	1 Lead		= 104	229
	1 Iodine		= 125	
Lime	1 Calcium		= 20	28
	1 Oxygen		= 8	
— Carbonate	1 Lime		= 28	50
	1 Carbonic Acid		= 22	
— Hydrate (slaked lime)	1 Lime		= 28	37
	1 Water		= 9	
— Phosphate	1 Lime		= 28	64
	1 Phosphoric Acid		= 36	
— Sulphate	1 Lime		= 28	68
	1 Sulphuric Acid		= 40	
— Tartrate	1 Lime		= 28	94
	1 Tartaric Acid		= 66	
Magnesia	1 Magnesium		= 12	20
	1 Oxygen		= 8	
— Carbonate	1 Magnesia		= 20	42
	1 Carbonic Acid		= 22	

	Atoms.		Equivalents.	
Magnesia, Sulphate - -	1 Magnesia - - -		= 20	60
	1 Sulphuric Acid - -		= 40	
—— —— (cryst^{d}.) - -	1 Dry Sulphate - - -		= 60	123
	7 Water - - -	(9 × 7)	= 63	
Manganese - - - - - - - - - - - - - -				28
—— Binoxide - -	1 Manganese - - -		= 28	44
	2 Oxygen - - -	(8 + 2)	= 16	
Mercury - - - - - - - - - - - - - -				200
—— Protoxide - -	1 Mercury - - - -		= 200	208
	1 Oxygen - - -		= 8	
—— Binoxide - -	1 Mercury - - -		= 200	216
	2 Oxygen - - -	(8 × 2)	= 16	
—— Chloride (Calomel) -	1 Mercury - - -		= 200	236
	1 Chlorine - - -		= 36	
—— Bichloride (Corrosive Sublimate) - -	1 Mercury - - - -		= 200	272
	2 Chlorine - - -	(36 × 2)	= 72	
—— Iodide - - -	1 Mercury - - - -		= 200	325
	1 Iodine - - - -		= 125	
—— Biniodide - -	1 Mercury - - - -		= 200	450
	2 Iodine - -	(125 × 2)	= 250	
—— Protosulphate -	1 Protoxide of Mercury -		= 208	248
	1 Sulphuric Acid - -		= 40	
—— Persulphate - -	1 Peroxide of Mercury -		= 216	296
	2 Sulphuric Acid -	(40 × 2)	= 80	
—— Sulphuret - -	1 Mercury - - - -		= 200	216
	1 Sulphur - - - -		= 16	
—— Bisulphuret - -	1 Mercury - - - -		= 200	232
	2 Sulphur - - -	(16 × 2)	= 32	
—— Bicyanuret - -	1 Mercury - - - -		= 200	252
	2 Cyanogen - -	(26 × 2)	= 52	
—— Protonitrate - -	1 Protoxide of Mercury -		= 208	262
	1 Nitric Acid - - -		= 54	
—— Pernitrate - -	1 Peroxide of Mercury -		= 216	324
	2 Nitric Acid - -	(54 × 2)	= 108	
Morphia - - - - - - - - - - - - - -				284
—— Acetate - - -	1 Morphia - - - -		= 284	335
	1 Acetic Acid - - -		= 51	
—— Hydrochlorate -	1 Morphia - - - -		= 284	321
	1 Hydrochloric Acid - -		= 37	

	Atoms.			Equivalents.
Nitrogen				14
Oxygen				8
Phosphorus				16
Potassa	1 Potassium		= 40	48
	1 Oxygen		= 8	
—— (hydrate)	1 Dry Potassa		= 48	5
	1 Water		= 9	
—— Acetate	1 Potassa		= 48	99
	1 Acetic Acid		= 51	
—— Arsenite	1 Potassa		= 48	98
	1 Arsenious Acid		= 50	
—— Bicarbonate	1 Potassa		= 48	92
	2 Carbonic Acid	(22 × 2)	= 44	
—— —— (cryst^{d}.)	1 Dry Bicarbonate		= 92	101
	1 Water		= 9	
—— Bisulphate	1 Potassa		= 48	128
	2 Sulphuric Acid	(40 × 2)	= 80	
—— —— (crsyt^{d}.)	1 Dry Bisulphate		= 128	146
	2 Water	(9 × 2)	= 18	
—— Bitartrate	1 Potassa		= 48	180
	2 Tartaric Acid	(66 × 2)	= 132	
—— —— (cryst^{d}.)	1 Dry Bitartrate		= 180	189
	1 Water		= 9	
—— Carbonate	1 Potassa		= 48	70
	1 Carbonic Acid		= 22	
—— Chlorate	1 Potassa		= 48	124
	1 Chloric Acid		= 76	
—— Nitrate	1 Potassa		= 48	102
	1 Nitric Acid		= 54	
—— Sulphate	1 Potassa		= 48	88
	1 Sulphuric Acid		= 40	
—— Tartrate	1 Potassa		= 48	114
	1 Tartaric Acid		= 66	
Potassium				40
—— Bromide	1 Potassium		= 40	118
	1 Bromine		= 78	
—— Chloride	1 Potassium		= 40	76
	1 Chlorine		= 36	
—— Sulphuret	1 Potassium		= 40	56
	1 Sulphur		= 16	

	Atoms.		Equivalents	
Potassium, Bisulphuret	1 Potassium		= 40	72
	2 Sulphur	(16 × 2)	= 32	
Quinia				162
—— Disulphate	2 Quinia		= 324	364
	1 Sulphuric Acid		= 40	
—— —— (recent crystals)	1 Dry Sulphate of Quinia		= 364	436
	8 Water	(9 × 8)	= 72	
Silver				108
—— Oxide	1 Silver		= 110	118
	1 Oxygen		= 8	
—— Chloride	1 Silver		= 110	146
	1 Chlorine		= 36	
—— Cyanide	1 Silver		= 110	136
	1 Cyanogen		= 26	
—— Nitrate	1 Oxide of Silver		= 118	172
	1 Nitric Acid		= 54	
Soda	1 Sodium		= 24	32
	1 Oxygen		= 8	
— Hydrated	1 Dry Soda		= 32	41
	1 Water		= 9	
— Acetate	1 Soda		= 32	83
	1 Acetic Acid		= 51	
— — (cryst^d.)	1 Dry Acetate		= 83	137
	6 Water	(9 × 6)	= 54	
— Carbonate	1 Soda		= 32	54
	1 Carbonic Acid		= 22	
— — (cryst^d.)	1 Dry Carbonate		= 54	144
	10 Water	(9 × 10)	= 90	
— Citrate	1 Soda		= 32	90
	1 Citric Acid		= 58	
— Sulphate	1 Soda		= 32	72
	1 Sulphuric Acid		= 40	
— — (cryst^d.)	1 Dry Sulphate		= 72	162
	0 Water	(9 × 10)	= 90	
— Tartrate	1 Soda		= 32	98
	1 Tartaric Acid		= 66	
— Potassio-tartrate	1 Soda		= 32	212
	1 Potassa		= 48	
	2 Tartaric Acid	(66 × 2)	= 132	

	Atoms.		Equivalents.	
Soda, Hydrated Sesquicarbonate	2 Soda	(32 × 2) =	64	166
	3 Carbonic Acid	(22 × 3) =	66	
	4 Water	(9 × 4) =	36	
—— Bicarbonate	1 Soda	=	32	76
	2 Carbonic Acid	(22 × 2) =	44	
Sodium				24
—— Chloride (common salt)	1 Sodium	=	24	60
	1 Chlorine	=	36	
—— Oxide (Soda)	1 Sodium	=	24	32
	1 Oxygen	=	8	
Starch	7 Carbon	(6 × 7) =	42	96
	6 Hydrogen	=	6	
	6 Oxygen	(8 × 6) =	48	
Strychnia				234
Sulphur				16
Sulphuretted Hydrogen	1 Sulphur	=	16	17
	1 Hydrogen	=	1	
Tin				58
Water	1 Oxygen	=	8	9
	1 Hydrogen	=	1	
Zinc				32
—— Oxide	1 Zinc	=	32	40
	1 Oxygen	=	8	
—— Carbonate	1 Oxide of Zinc	=	40	62
	1 Carbonic Acid	=	22	
—— Sulphate	1 Oxide of Zinc	=	40	80
	1 Sulphuric Acid	=	40	
—— —— (cryst^{d}.)	1 Dry Sulphate	=	80	134
	6 Water	(9 × 6) =	54	

TABLE III.

WEIGHTS AND MEASURES.

In the compounding of medicines TROY WEIGHT is directed to be employed by the London College: the *pound* (containing 5760 grains) is subdivided into twelve *ounces;* the *ounce* into eight *drachms;* the *drachm* into three *scruples;* the *scruple* into twenty *grains.*

lb. Pound.		℥ Ounces.		ʒ Drachms.		℈ Scruples.		gr. Grains.		French Grammes.
1	=	12	=	96	=	288	=	5760	=	372·960
		1	=	8	=	24	=	480	=	31·080
				1	=	3	=	60	=	3·885
						1	=	20	=	1·295

But nearly all drugs, like other ordinary commodities, are purchased and sold by AVOIRDUPOIS WEIGHT, of which the *pound* (containing 7000 grains) is subdivided into sixteen *ounces*, and the *ounce* into sixteen *drachms.*

lb. Pound		oz. Ounces.		dr. Drachms.		gr. Grains.		French Grammes.
1	=	16	=	256	=	7000	=	453·250
		1	=	16	=	437·50	=	28·328
				1	=	27·34	=	1·770

175 Troy pounds are equal to 144 avoirdupois or IMPERIAL pounds; 175 troy ounces are equal to 192 avoirdupois ounces. 14 ounces, 11 pennyweights, 15½ grains troy, are equal to 1 pound avoirdupois; and 18 pennyweights, 5½ grains troy, are equal to 1 ounce avoirdupois. The following is the usual division of the troy pound:—

lb. Pound.		oz. Ounces.		dwt. Pennyweights.		gr. Grains.
1	=	12	=	240	=	5760
		1	=	20	=	480
				1	=	24

In the measurement of liquids the IMPERIAL or STANDARD Gallon is employed; it contains 10 avoirdupois pounds of water of 7000 grains each, or 70,000 grains of water = 277·273 cubic inches at the temperature of 62° Fahrenheit. It is subdivided for medicinal purposes as follows:—

C Gallon.		O Pints.		f℥ Fluid-ounces.		fʒ Fluid-drachms.		♏ Minims.
1	=	8	=	160	=	1280	=	76800
		1	=	20	=	160	=	9600
				1	=	8	=	480
						1	=	60

TABLE IV.

Temperature is in all cases specified in the language of *Fahrenheit's* thermometric scale, in which the freezing point of water is marked 32°, and the boiling point 212°; the space between these two points being divided into 180 equal parts or *degrees*. The graduation proceeds downwards to 0° or *zero*, which is the lowest temperature to be obtained from a mixture of snow and salt, and 32° below the freezing point of water, or what amounts precisely to the same thing, below the point at which ice begins to thaw. The graduation is then carried on below zero, in the same way as above.

In France, Sweden, and many other parts of Europe, the *Centigrade* thermometric scale, originally used by *Celsius* in Sweden, is employed, in which the freezing point of water is marked 0°, and the boiling point 100°.

In Italy, and in many parts of Germany and elsewhere, a third thermometric scale is used, namely, that of *Reaumur*, in which the freezing point of water being marked 0°, the boiling point is marked 80°.

To distinguish, in each of these thermometers, the degrees above 0° from those below 0°, the mark + or *plus* is frequently annexed to the former, and the mark − or *minus* to the latter; but when the degree is merely stated without prefix or remark, it is generally understood, especially with us, as referring to the degrees above zero.

The temperature, as expressed by one thermometer, may be reduced to that of either of the others, by knowing the relation which subsists between their respective degrees. Thus 180°, (the number of degrees between the freezing and the boiling points of water on *Fahrenheit's scale*,) is to 100° (the number of degrees between the freezing and boiling points on the *Centigrade scale*) as 9 to 5; and to 80° (the number of degrees between the freezing and boiling points on *Reaumur's scale*) as 9 to 4. Nine degrees, therefore, of Fahrenheit are equal to five of the Centigrade, and to four of Reaumur's scale. Hence Fahrenheit's degrees are reduced to those of the Centigrade by multiplying by 5 and dividing by 9, or to those of Reaumur by multiplying by 4 and dividing by 9. On the other hand, by reversing this process, the degrees of the Centigrade and of Reaumur are reduced to those of Fahrenheit, the multiplier being then 9, and the divisor 5, in the one case, and 4 in the other. In these reductions it must be recollected that the zero of Fahrenheit's thermometer, is 32° below that of the Centigrade and of Reaumur, as in the following instances:—

Fahrenheit. Centigrade.

$$68^\circ - 32^\circ = 36 \times 5 = 180 \div 9 = 20^\circ$$
$$212 - 32 = 180 \times 5 = 900 \div 9 = 100$$

Centigrade. Fahrenheit.

$$10^\circ \times 9 = 90 \div 5 = 18 + 32 = 50^\circ$$
$$100 \times 9 = 900 \div 5 = 180 + 32 = 212$$

Fahrenheit. Reaumur.

$$59^\circ - 32 = 27 \times 4 = 108 \div 9 = 12^\circ$$
$$212 - 32 = 180 \times 4 = 720 \div 9 = 80$$

Reaumur. Fahrenheit.

$$40^\circ \times 9 = 360 \div 4 = 90 + 32 = 122^\circ$$
$$80 \times 9 = 720 \div 4 = 180 + 32 = 212$$

Centigrade. Reaumur.

$$55^\circ \times 4 = 220 \div 5 = 44^\circ$$
$$100 \times 4 = 400 \div 5 = 80$$

Reaumur. Centigrade.

$$56^\circ \times 5 = 280 \div 4 = 70^\circ$$
$$80 \times 5 = 400 \div 4 = 100$$

The above are examples, therefore, of the following general theorem: Let F denote the degrees on the scale of Fahrenheit, C those of the Centigrade, and R those of Reaumur; then

To convert the degrees of Fahrenheit into those of the Centigrade,

$$C = \frac{(F - 32) \times 5}{9}$$

To convert the degrees of the Centigrade into those of Fahrenheit,

$$F = 32 + \frac{9\,C}{5}$$

To convert the degrees of Fahrenheit into those of Reaumur,

$$R = \frac{(F - 32) \times 4}{9}$$

To convert the degrees of Reaumur into those of Fahrenheit,

$$F = \frac{9\,R}{4} + 32$$

To convert the Centigrade degrees into those of Reaumur,

$$R = \frac{4}{5} \times C$$

To convert the degrees of Reaumur into those of the Centigrade,

$$C = \frac{5}{4} \times R$$

The following table, shows the degrees of Reaumur, and of the Centigrade scale, corresponding with those of Fahrenheit, between the boiling point of water and the freezing point of mercury; or between + 212° and – 40° Fahrenheit.

Fah.	Reaum.	Cent.	Fah.	Reaum.	Cent.	Fah.	Reaum.	Cent.	Fah.	Reaum.	Cent.
212	80	100	148	51·5	64·4	84	23·1	28·8	20	−5·3	−6·6
211	79·5	99·4	147	51·1	63·8	83	22·6	28·3	19	−5·7	−7·2
210	79·1	98·8	146	50·6	63·3	82	22·2	27·7	18	−6·2	−7·7
209	78·6	98·3	145	50·2	62·7	81	21·7	27·2	17	−6·6	−8·3
208	78·2	97·7	144	49·7	62·2	80	21·3	26·6	16	−7·1	−8·8
207	77·7	97·2	143	49·3	61·6	79	20·8	26·1	15	−7·5	−9·5
206	77·3	96·6	142	48·8	61·1	78	20·4	25·5	14	−8	−10
205	76·8	96·1	141	48·4	60·5	77	20	25	13	−8·4	−10·5
204	76·4	95·5	140	48	60	76	19·5	24·4	12	−8·8	−11·6
203	76	95	139	47·5	59·4	75	19·1	23·8	11	−9·3	−11·1
202	75·5	94·4	138	47·1	58·8	74	18·6	23·3	10	−9·7	−12·2
201	75·1	93·8	137	46·6	58·3	73	18·2	22·7	9	−10·2	−12·7
200	74·6	93·3	136	46·2	57·7	72	17·7	22·2	8	−10·6	−13·3
199	74·2	92·7	135	45·7	57·2	71	17·3	21·6	7	−11·1	−13·8
198	73·7	92·2	134	45·3	56·6	70	16·8	21·1	6	−11·5	−14·4
197	73·3	91·6	133	44·8	56·1	69	16·4	20·5	5	−12	−15
196	72·8	91·1	132	44·4	55·5	68	16	20	4	−12·4	−15·5
195	72·4	90·5	131	44	55	67	15·5	19·4	3	−12.8	−16·1
194	72	90	130	43·5	54·4	66	15·1	18·8	2	−13·3	−16·6
193	71·5	89·4	129	43·1	53·8	65	14·6	18·3	1	−13·7	−17·2
192	71·1	88·8	128	42·6	53·3	64	14·2	17·7	0	−14·2	−17.7
191	70·6	88·3	127	42·2	52·7	63	13·7	17·2	−1	−14·6	−18·3
190	70·2	87·7	126	41·7	52·2	62	13·3	16·6	−2	−15·1	−18·8
189	69·7	87·2	125	41·3	51·6	61	12·8	16·1	−3	−15·5	−19·4
188	69·3	86·6	124	40·8	51·1	60	12·4	15·5	−4	−16	−20
187	68·8	86·1	123	40·4	50·5	59	12	15	−5	−16·4	−20·5
186	68·4	85·5	122	40	50	58	11·5	14·4	−6	−16·8	−21·1
185	68	85	121	39·5	49·4	57	11·1	13·8	−7	−17·3	−21·6
184	67·5	84·4	120	39·1	48·8	56	10·6	13·3	−8	−17·7	−22·2
183	67·1	83·8	119	38·6	48·3	55	10·2	12·7	−9	−18·2	−22·7
182	66·6	83·3	118	38·2	47·7	54	9·7	12·2	−10	−18·6	−23·3
181	66·2	82·7	117	37·7	47·2	53	9·3	11·6	−11	−19·1	−23·8
180	65·7	82·2	116	37·3	46·6	52	8·8	11·1	−12	−19·5	−24·4
179	65·3	81·6	115	36·8	46·1	51	8·4	10·5	−13	−20	−25
178	64·8	81·1	114	36·4	45·5	50	8	10	−14	−20·4	−25·5
177	64·4	80·5	113	36	45	49	7·5	9·4	−15	−20·8	−26·1
176	64	80	112	35·5	44·4	48	7·1	8·8	−16	−21·3	−26·6
175	63·5	79·4	111	35·1	43·8	47	6·6	8·3	−17	−21·7	−27·2
174	63·1	78·8	110	34·6	43·3	46	6·2	7·7	−18	−22·2	−27·7
173	62·6	78·3	109	34·2	42·7	45	5·7	7·2	−19	−22·6	−28·3
172	62·2	77·7	108	33·7	42·2	44	5·3	6·6	−20	−23·1	−28·8
171	61·7	77·2	107	33·3	41·6	43	4·8	6·1	−21	−23·5	−29·4
170	61·3	76·6	106	32·8	41·1	42	4·4	5·5	−22	−24	−30
169	60·8	76·1	105	32·4	40·5	41	4	5	−23	−24·4	−30·5
168	60·4	75·5	104	32	40	40	3·5	4·4	−24	−24·8	−31·1
167	60	75	103	31·5	39·4	39	3·1	3·8	−25	−25·3	−31.6
166	59·5	74·4	102	31·1	38·8	38	2·6	3·3	−26	−25·7	−32·2
165	59·1	73·8	101	30·6	38·3	37	2·2	2·7	−27	−26·2	−32·7
164	58·6	73·3	100	30·2	37·7	36	1·7	2·2	−28	−26·6	−33·3
163	58·2	72·7	99	29·7	37·2	35	1·3	1·6	−29	−27·1	−33·8
162	57·7	72·2	98	29·3	36·6	34	0·8	1·1	−30	−27·5	−34·4
161	57·3	71·6	97	28·8	36·1	33	0·4	1·5	−31	−28	−35
160	56·8	71·1	96	28·4	35·5	32	0	1·	−32	−28·4	−35·5
159	56·4	70·5	95	28	35	31	−0·4	−1·1	−33	−28·8	−36·1
158	56	70	94	27·5	34·4	30	−0·8	−1·5	−34	−29·3	−36.6
157	55·5	69·4	93	27·1	33·8	29	−0·3	−1·6	−35	−29·7	−37·2
156	55·1	68·8	92	26·6	33·3	28	−1·7	−2·2	−36	−30·2	−37·7
155	54·6	68·3	91	26·2	32·7	27	−2·2	−2·7	−37	−30·6	−38·3
154	54·2	67·7	90	25·7	32·2	26	−2·6	−3·3	−38	−31·1	−38·8
153	53·7	67·2	89	25·3	31·6	25	−3·1	−3·8	−39	−31·5	−39·4
152	53·3	66·6	88	24·8	31·1	24	−3·5	−4·4	−40	−32	−40
151	52·8	66·1	87	24·4	30·5	23	−4	5			
150	52·4	65·5	86	24	30	22	−4·4	−5·5			
149	52	65	85	23·5	29·4	21	−4·8	−6·1			

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